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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

PUBLISHED MONTHLY for the PHYSICIAN in the GENERAL PRACTICE of MEDICINE

CONTENTS:

THE SYMPOSIUM DEALING WITH PROBLEMS OF THE AGED

Presented by the Massachusetts Society for Research in Psychiatry

ALSO

INVESTIGATIONS IN GERONTOLOGY

by

EDWARD J. STIEGLITZ, M.D.

In charge of Investigations in Gerontology, U. S. Public Health Service

Complete Table of Contents on Front Inside Cover

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TABLE OF CONTENTS:

THIS ISSUE (Editorial) (Page 35)
Titus H. Harris, M.D., Galveston, Texas

INTRODUCTORY REMARKS (Editorial) (Page 35)
Clifton T. Perkins, M.D., Boston, Massachusetts

CURRENT TRENDS AND NEEDS IN RESEARCH ON PROBLEMS OF THE AGED (Page 37)
William Malamud, M.D., Worcester, Massachusetts

THE MEMORY FUNCTION IN PSYCHOSES OF THE AGED (Page 43)
David Shakow, M.A., Marjorie B. Dolkart, A.B. and Rosaline Goldman, M.A., Worcester, Massachusetts

THE ORIGIN OF SENILE PSYCHOSES: NEUROPATHOLOGIC FACTORS AND FACTORS OF A MORE PERSONAL NATURE (Page 49)
D. Rothschild, M.D. and M.L. Sharp, M.D., Foxborough, Massachusetts

INCIDENCE OF ABNORMAL ELECTROENCEPHALOGRAMS IN EPILEPTIC PERSONS OVER FORTY YEARS OF AGE (Page 55)
Leon J. Robinson, M.D., Palmer, Massachusetts

SOCIAL FACTORS IN OLD AGE PSYCHOSIS (Page 58)
Elvin V. Semrad, M.D. and Clementine C. McKeon, M.D., Waltham, Massachusetts

PSYCHIATRIC PROBLEMS OF THE AGED (Page 62)
Benjamin Simon, M.D. and S. Harvard Kaufman, M.D., Worcester, Massachusetts

VITAMIN STUDIES IN CEREBRAL ARTERIOSCLEROSIS (Page 66)
W. W. Jetter, M.D., A. M. Stiffle, M.D., L. Trowbridge, M.A. and E. Trowbridge, B.A., Taunton, Massachusetts

NICOTINIC ACID AND ASCORBIC ACID IN RELATION TO THE CARE OF THE AGED (Page 71)
Rupert A. Chittick, M.D. and Elmer Stotz, Ph. D., Waverley, Massachusetts

INVESTIGATIONS IN GERONTOLOGY (Page 74)
Edward J. Stieglitz, M.D., Bethesda, Maryland

CARE OF AGED PATIENTS IN DANVERS STATE HOSPITAL (Abstract) (Page 76)
Leo Maletz, M.D. and Grace H. Kent, Ph.D., Hathorne, Massachusetts

THE ELECTROENCEPHALOGRAM IN OLD AGE (Abstract) (Page 77)
P. A. Davis, M.A., Boston, Massachusetts

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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

EDITORIAL COMMENT

This Issue It is with very great pleasure that we set aside this, the February issue of *Diseases of the Nervous System,* for a presentation of the papers comprising *The Symposium Dealing with Problems of the Aged,* given at the first meeting of the Massachusetts Society for Research in Psychiatry, at the Taunton State Hospital, Taunton, Massachusetts on October 11, 1940.

As our readers well know, this is the first time that we have devoted an entire issue to one subject and, what is more, presented material of an experimental nature. Our policy has been to make available short, practical, diversified articles, covering as much of the scope of psychiatry and neurology as possible. The next, and succeeding, issues of *Diseases of the Nervous System* will revert to this policy.

The reasons for focusing special attention at this time on problems of the aged are so well covered in the following pages that we shall leave them to speak for themselves.

We also wish to call attention to the article entitled, *Investigations in Gerontology* by Dr. Stieglitz. This was not included in the Symposium, but it is so relevant and sums up the national picture so well, that we felt its inclusion was imperative. In this connection, we want to call attention to the closing sentence of Dr. Stieglitz' article, "Information concerning subjects under investigation and the methods of approach is earnestly solicited."

TITUS H. HARRIS, M.D., *Editor*
Galveston, Texas.

Introductory Remarks The recent organization of the Massachusetts Society for Research in Psychiatry should constitute a challenge to all individuals interested in research in psychiatry and associated disciplines within the state—a challenge to those who are included in its membership, as well as to those not now so included. The main purpose of the society is the stimulation of research in psychiatry in the schools for the feebleminded and the mental hospitals of the state, both public and private. The Society has determined that only individuals who have contributed to psychiatric research shall be eligible for full membership and, in order to maintain that membership, they must make satisfactory

contributions to research at least once every three years. These are commendable minimum standards, bound to perpetuate a producing active membership. Associate memberships are available to all those seriously interested in research in psychiatry and allied disciplines. The Society contemplates statewide comprehensive attacks on major psychiatric problems, plans frequent closed meetings to discuss problems of mutual interest to the membership, and more open semiannual seminars in which completed researches are to be presented.

The State Research Advisory Committee to the Department has expressed its willingness to aid the new Society with advice whenever aid is requested by the membership either as a group or individually. The Society may depend on the enthusiastic support of the Department of Mental Health in its effort to stimulate further and better researches in the broad field of psychiatry in Massachusetts.

This first Symposium of the Massachusetts Society for Research in Psychiatry considers one of the most important and urgent problems confronting psychiatrists—"The Problems of the Aged."

We are familiar with the fact that over recent decades there has been a shift of population of this country to the older age groups. Owing to the lower birth rate, limitations of immigration, progressions in general hygienic measures, and advances in medical care, there has been a steady increase in the number of individuals in the age groups above 60 years. It is inevitable that a certain proportion of those patients should develop mental disorders. Thus, a part of the increase in the older age group has been due to the population increase of individuals belonging to the older age groups.

However, there has been another factor in the past few years that has been of importance to administrators in the field of Mental Health. The heightening of the tempo of living and the kaleidoscopic changes taking place in the past two decades have thrown tremendous strains upon the ages which have been able to bear them least. Thus, an increase in mental disorders in the older age groups, due to these added pressures, might have been expected even though there had been no actual population increase in these ages. The two factors have worked together, however, to produce a very interesting phenomenon. The increases in mental disorders in ages over 50 years are running ahead of the increases in the population in the same age groups. This double increase of patients with mental disorders in the older ages will eventually necessitate many changes in the medical administrative technique of our mental hospitals. For one thing, we will have to plan a greater provision for bed patients in future years. The building of institutions, now constructed largely for the ambulatory mental patient, will give way gradually to the purely hospital atmosphere.

These marked changes taking place in the type of patient being admitted to our mental hospitals will require many adaptations on the part of our medical staffs and nursing personnel. It is fitting, therefore, that the present symposium should be devoted to the problems of the mental disorders in the aged. It may be well for us to make a thorough study of this particular group of patients, and thus be prepared to meet the changing demands on our hospitals which may be accepted as inevitable for the future.

The Department congratulates the Society upon its present aggressive attack on a major problem and offers again its full cooperation for encouragement and assistance in future attacks.

CLIFTON T. PERKINS, M.D.
Commissioner
Department of Mental Health
Commonwealth of Massachusetts
Boston, Massachusetts.

Current Trends and Needs in Research on Problems of the Aged

WILLIAM MALAMUD, M.D.
Worcester, Massachusetts

Dr. Malamud received the degree of M.D.C.M. from the McGill University Medical Faculty in 1921. Following post-graduate work in this country and abroad and a three-year service as Director of Laboratories at the Foxborough State Hospital, he held the position of Professor of Psychiatry at the University of Iowa. At present, he is Clinical Director at the Worcester State Hospital and Consultant in Psychiatry to the Worcester City Hospital. He is also Professor of Clinical Psychiatry at Tufts Medical School, Boston. He is a member of the American Neurological, American Psychiatric, and Central Neuropsychiatric Associations. He is President of the Massachusetts Society for Research in Psychiatry. His publications in periodicals, both here and abroad, deal with neuropathology, psychopathology, and clinical neurology and psychiatry. He is a Diplomate in neurology and psychiatry.

The choice of the subject of Problems of the Aged for this symposium is a manifestation of a wide spread interest which, within the last few years, has progressively gained in impetus in the different fields of the sociobiological sciences. Medicine, Psychology and Sociology, if we can judge by their publications and research activities, have all shown an unprecedented curiosity about this subject and for quite obvious practical reasons. In medicine, for instance, the growth of interest can easily be seen to run parallel to the recent increase in patients falling into this age group. This is particularly noticeable in the psychiatric field where, within the last two decades, statistical studies have shown an increase in admission of old people definitely out of proportion either to the increase in the general population or in our hospitals.

To approach this problem intelligently we must try to discover the mechanisms underlying such a disproportionate growth. Partially, of course, this is due to two obvious factors. First, the number of aged people in the general population has shown a disproportionate increase during the last few decades. Statistics show that the proportion of people over 65 as compared with the rest of the population has risen in the ninety years from 1850 to 1940 from 2.6 per cent to 6.3 per cent, a fact so impressive that Dublin refers to it as a sign that we are becoming a "nation of elders." Thus we expect that the increase of patients from this age group would be out of proportion to that of other types of patients in our hospitals. Secondly, of course, more of these patients are recognized as medical problems, due to the change in general attitude and the more efficient methods of early diagnosis.

In addition to these two, however, there must be other factors which have caused the enormous increase mentioned above. Is the change in tempo and strain of modern living, which may be borne adequately by the younger elements in the population, a factor in producing mental disorders in the aged, who cannot so well withstand the impact of these changes? Is it a more subtle change caused by the increasing proportion of older people which necessitates their assuming roles which are new to them? Or, finally, is there some new, hitherto unappreciated factor which we must take into consideration in future research? Whatever the reasons may be—and, in order to carry out intelligently organized research we shall have to determine these reasons—a large proportion of our case load falls into this age-bracket and we must look for methods of investigation into their manner of development, treatment and, above all, of prevention.

The remarkable increase of the span of lfie which has, of course, served as the most important reason for the increased proportion of the older age-groups is primarily the result of medical research. In accordance with the Hippocratic maxim, the medical man does not ask why human life should be prolonged. We might, however, pose this question: what is the advantage of exhaustive efforts to prolong the life-span, on the one hand, if, on the other, the physician's labors are doubled by having to take care of the many ills and infirmities of old age? Can we demonstrate that the increase of old people in the population brings with it certain assets to the individual and to the group which will offset the increase in disease and debility? A satisfactory answer to this question will naturally depend upon the proper definition of the goal toward which medicine strives in increasing

the length of the individual life-span. Logically, there are three such possible goals: (1) Science may be playing again with the old idea of making man immortal—eliminating death; (2) Science may be attempting to revive another old dream—that of keeping man from growing old; (3) It may be the aim of science to increase the life-span and to make more efficient the adjustment during this older age-period.

Leaving out all metaphysical implications, the desirability of the first two possible aims of research is questionable. What price immortality if it must be spent, as in the old myth, in a feeble, degenerated and senile state? Or, in the second case, if we should find some "elixir" of youth, a search that has had some serious but doubtfully successful attention during recent years, would we not find serious disadvantages that might more than offset the charms of eternal youth? Any efforts in this direction are complicated, in the first place, by the difficulty in determining the line of demarcation between youth and old age. Biologically speaking, some of our organs, if not the whole organism begin to age from the moment they begin to live. Also we must remember that the process of ageing is more than just growing senile. Growth and maturity bring new and more advantageous methods of adjustment to environment, even though at the expense of earlier and perhaps dearly cherished methods of gratification. An infant or a child is much less capable of dealing successfully with nature in the raw, so to speak, than is the mature adult. If this is true of the process of becoming an adult, can it not also be true of the period following the middle years? If so and if these assets can be shown to be important for the welfare of the group as well as for the individual, it would seem much more desirable to retain a composition of different ages in the population than to have it consist of a homogeneous population of youth. We shall return to this consideration later in the discussion. If we assume this for a moment, however, we are left with the third possible aim of science as the only logical one—that is, to attempt to increase the life span, at the same time retaining the different stages of growth, but trying to increase the assets of each while diminishing their liabilities.

Hitherto, this actually was the motivating factor in research work carried on in relation to other stages of human life. We have long realized that the human organism at any stage of its development has its own characteristic advantages and disadvantages. Increasing medical knowledge entirely changed our attitude toward the inevitability of infant mortality. The dangers of the child-bearing period in women have been lessened in the same way. Can we not also apply this principle to the problems of old age and, as physicians, attempt to learn what makes old people subject to certain types of disease, debility and to adjustment in general? If we can then find that old age brings with it certain qualities which are useful to the individual and to the group we will have gained the ideal goal of the effort to prolong life. In other words, we will have secured a useful component of group structure without having to pay for it by carrying a burden of helpless people. The medical man will thus vindicate himself by removing the apparent dilemma in which his one hand increases the problems which his other hand tries to heal. The logical orientation for a research program in this field, therefore, will deal with two problems: (1) What are the assets and advantages of old age that cannot be found at any other stage of human development; and (2) what are the pathological conditions characteristic of this stage of life, their etiology, method of treatment and means of prevention? And finally how shall we now differentiate the pathological conditions from the so-called physiological changes of old age?

The problem is by no means a simple one. It has taxed the ingenuity of man for ages past and its complexity and the difficulty in its approach are partly responsible, perhaps, for the scarcity of data in this field. The difficulties are manifold. To begin with, strictly scientific investigation is seriously hampered by the very goal toward which it is aiming, namely the increase of the individual life-span with its multitude of variations. Logically, such an investigation should begin with birth and be carried on throughout the life of the individual specimen. This is obviously not only difficult, but, in the case of any given research worker, impossible since the

subject studied may outlive the experimentor. So far, studies of this type have been made only on animals and we all know how grossly inadequate such conclusions are when applied to human beings. Not only may there be vast quantitative differences, but we also know that certain structural changes, in the central nervous system for instance, have never been observed in animals. Added to this is the fact that, of all human problems, the study of old age in all its ramifications involves one of the most inclusive transformations conceivable since we are dealing with a process that affects the entire human organism—its organs and functions, attitudes, social relationships and so on. Whenever an attempt is made to isolate any given component of the organism to study changes occuring during senescence we are immediately faced with the possibility of relationship to changes occurring in all other components. As a matter of fact, this is one of the most characteristic features that one encounters in reading the literature on the subject. There is a continual attempt to relegate changes observed in any given organ to possible secondary place because of a change in some other organ. Finally, there seems to be a most regrettable state of confusion in the minds of most investigators as to what is to be expected in old age—in other words, physiological senescence as opposed to superimpositions of senile pathology.

In taking stock of what we have learned so far, it is obvious that our first efforts must be directed toward clarification of the last problem—that is, what do we actually know of the changes that are observed in the ageing individual; which of these can be regarded with reasonable certainty as the inevitable accompaniments of normal old age; and which are the conditions superimposed upon them? Fortunately for our purpose, some recent publications present the accumulated data in a clear and concise fashion, showing their shortcomings and indicating leads for future investigations. Obviously, we cannot give even an abstract of the findings reported in the literature in this communication. We can, however, pick out the most essential features and try to marshal them in relation to the points raised above. Since we are primarily interested in the neuropsychiatric problems and would like to emphasize particularly the changes observed in the systems most closely related to these, we will begin with the most peripherally located tissues and move inward.

The skin and its appendages have traditionally been regarded as the most obvious indices of the ageing process. The changes observed here should be considered not only in terms of actual reduction of function and interference with adjustment, but also in terms of their psychological effects upon the individual and upon the group in which he lives. The depressing effect of the first appearance of gray hair and wrinkles far surpasses the reaction to ageing of other organs. These organic conditions may be much more serious, in their interference with adjustment and may be unnoticed by the individual or by others. Actually, changes in the skin and its accessories are probably the least likely to interfere with the proper function of the organism. The points that are stressed here particularly, are keratinization and wrinkling of the skin, baldness and grayness of the hair, dehydration and loss of subcutaneous tissue and decrease of elasticity. These changes, as is true of other systems also, are not necessarily limited to old age. Also, aside from the fact that they may act as predisposing factors toward malignant growths and infections, they do not in themselves have any effect upon the healthy adjustment of the individual. Further, it is not at all certain that these are primary signs of the ageing process. They may be dependent upon disturbances elsewhere as, for instance, body fluid changes or endocrine disturbances. The musculo-skeletal system shows dehydration and a decrease of intra- and an increase of inter-cellular fluid resulting in losses of elasticity and resilience which lead to impaired function. Again the questions arise: to what extent is this an inevitable "physiological" phenomenon of age, or, as Todd puts it, are these "the honorable scars of resistance and repair."

The cardio-vascular system has always been regarded as an important component in relation to age. The old dictum that a man is "as old as his arteries" holds true, not only in relation to that system itself, but also in relation to the secondary effects upon all the

other tissues which depend primarily upon efficient circulation. This system is of further importance when one remembers that about half of the deaths in old age are caused by cardio-vascular disturbances. Arteriosclerosis, hypertension and cardiac involvements of various kinds are usually taken for granted in old people. But their relation to other functions such as the endocrine systems, the kidney and homeostasis and their dependence upon infectious processes such as syphilis or rheumatic fever have not been conclusively clarified. The questions that arise are: should arteriosclerosis, for instance, be regarded as a "normal" process that appears with age, should it be looked upon as a result of wear and tear, or may it be mostly dependent upon disease processes that can be prevented.

Similar queries may be raised in the consideration of the digestive system and the urinary apparatus. Decrease in size of the gastro-intestinal tract and achlorydria, which are typical of old age, certainly affect the smooth functioning of the organism as a whole and predispose it to infections and malignant disease. However, their etiologies have never been definitely understood nor has it been conclusively established whether they are of primary or secondary character. The relatively pure ageing process of the kidneys must be thought of as an ageing of the vessels, but this is not a simple degenerative process since here, as in the brain, the lessening of function in some vessels is compensated for by the appearance of new ones. Thus we find the first signs of successful resistance against the ravages of old age even though the compensatory mechanisms never reach the efficiency of the original set-up. Lymph tissue, also, shows a characteristic decrease in amount and function. The implications of this are clear, of course. There is a lessened ability to deal with toxic factors and infections. We must remember, however, that this tissue bears most of the brunt of the fight of the organism against infection throughout life. Should these changes be considered as a result of wear and tear, or are they simply a matter of inevitable change in time?

As we move further inward and nearer to the organs that are more closely related to the central nervous system, we come to the important but still obscure set of factors in the endocrine glands. At the center of this problem we find the ageing of the gonads. One would logically think of changes here as being the most clearcut in their relationship to old age. The function of reproduction ceases quite definitely in old age, even though we allow for variations in the sexes and in individuals. With all the work that has been done in this field, however, we still do not have the answer to the important question as to whether this is the inevitable result of age or whether it is in some way dependent upon other processes. Is it a primary process which gives rise, in turn, to senile degeneration in other organs, or is it, in itself, related to changes that have previously occurred in other endocrine glands or in systems outside of these? The same questions arise concerning the other components of this chain—the parathyroids, pituitary, thyroid, etc. It is distressing to find that this field, from which so much was hoped in the way of answers to the secrets of life and death and the relationships of evolution and dissolution, remains very much of an enigma in spite of the great accumulation of factual data.

Inevitably we turn to the investigations on the body fluids and their chemistry for the answer to some of these questions. The fundamental problem of homeostasis and its mechanisms should logically hold the key to many of them. But we find that there is very little change in this process, according to most recent findings. Cannon states that homeostasis, as such, is preserved in old age and there are no noteworthy changes in body temperature, glucose content or hydrogen-ion concentration in senescence uncomplicated by other pathological processes. Qualitatively, an impairment does occur in that the ageing body does not adjust itself as easily to quick disturbances as it does in earlier life, but again the primary quality of this impairment is not settled. Another important factor is the chemical composition of the tissues and body fluids and this represents one of the most promising leads for investigation. Thus we know from animal experimentation that diet has an important effect on growth and longevity. A review of this field by McCay, however, concludes with the remark that "almost nothing is known

of the biochemistry of the aged" although he feels that the importance of this field of research cannot be overrated. Another interesting point to consider in this connection is the responsiveness of the cells to substances circulating in the body fluids. This phenomenon, which is probably related to homeostatic regulations on the one hand and to cell permeability on the other, may be at the basis of the slowing up of the regulatory mechanisms and the changes in the rhythms of exchange, both of them impeding adjustments to sudden changes within the organism and outside of it.

In the nervous system itself definite changes related to age have been observed and are probably very important in the general adjustment of the organism. Sensory organs such as the eye and the ear show definite changes. The eye tissues show an increased density, dehydration and accumulation of inert material, loss of fat and elasticity and tissue atrophy. These changes result in interference with vision, of course, but whether they are due to age, or to the cumulative effect of disturbances in other systems or diseases in the eye itself is still in question. This is also true of the impairment of hearing of high-pitched tones which occurs in old age quite generally.

The characteristic changes in the central nervous system are well-known and, furthermore, will be dealt with extensively in another paper in this symposium. Descriptively, we know a great deal about these in normal old people and in senile psychoses, but little is known of their etiology. Senile placques, fibril changes in the cells, vascular pathology and atrophy of the brain should logically be regarded as the factors primarily responsible for the changes in personality, psychotic symptoms, deterioration of intelligence and all the behavior disturbances that we find in the aged population in our state hospitals. Recently, however, this comfortable assurance has been given a serious jolt. In the first place, we find such physiological changes in brains of people who have shown very few behavior anomalies. In the second place, there is a serious question raised as to the existence of quantitative relationships. Rothschild and others have shown that the severity of the neuropathological findings does not, in itself, determine the degree of disturbance in behavior. Other factors come into operation and in his paper today he will discuss these on the basis of case material. It is sufficient to mention here that, in his estimation, personality characteristics, early experiences and immediate social problems are perhaps just as important in the development of the disease, or in the determination of faulty attitudes and infirmities in normal senescence, for that matter, as are the actual organic changes.

This question of quantitative relationships between organic changes and personality functions brings us to the problem which, from a practical psychiatric point of view, is the most important— that is, the personality disturbances of old age and their effects upon adjustment to society. The data presented so far, meager as they are, show that some physiological decrements do take place in the ageing animal. The question is, how much are the psychological disturbances the direct effects of these, how much are they produced as a reaction to them and, finally, to what extent are they the products of anticipation of the traditionally accepted deterioration that comes with age?

Popularly, as well as scientifically, certain characteristic changes in the personality functions have become established as a tradition. Those most frequently stressed are disturbance of memory; decrease of educability; slowing up of reaction time; increase of cautiousness and conservatism; and decrease of initiative, particularly as regards new ventures. The psychiatric superimpositions are mainly quantitative exaggerations of these plus the development of pathological attitudes such as a depressive outlook on the future, apprehensiveness, confusion, restlessness, emotional lability and occasionally misinterpretations and even delusions. The experimental investigations of these phenomena, their occurrence and extent in psychotics as compared with normal old people, and their effect upon behavior will be dealt with more extensively in one of the papers in this symposium. It goes without saying that some or all of these have a definite effect on adjustment, but we might raise the question as to whether they should all be considered exclusively as liabilities. Those psy-

chological functions which depend upon quick reactions, keenness of sensori-motor activity and easy adjustibility to new situations may be more successfully carried out by younger people; but where the behavior product involves accumulated knowledge, stability and judgment, the experience of age may be definitely advantageous. This is primarily true, of course, of so-called normal old people rather than of the psychotic, but in the latter one wonders whether socially accepted criteria and anticipations and the attitudes of the group acting upon a personality originally of less stable and more sensitive make-up may be responsible, in part, for the pathological process.

Furthermore, one must consider other psychogenic mechanisms in the development of these features. Is conservatism, for instance, or the loss of the sense of adventure, a product of physiological deterioration, or may it be regarded as the result of experience which has developed the ability to see more possibilities in a given situation, or which has had repeated frustrations which in turn have led to the loss of hope, and even of desire, to attempt new ventures?

Given a particularly unfortunate set of experiences of this kind can we envisage much of the process of deterioration as a matter of surrender in view of the multitude of obstructions? From a sociological point of view, this becomes of great importance. On the one hand, it challenges us, in our attempts to prevent such disturbances in old age, to look for the possibility of establishing a mental hygiene program for old age of a kind similar to that which has been organized in relation to the earlier stages of life. On the other hand, one speculates on the extent to which these characteristics might be utilized to the advantage of the group. The old man has been traditionally accepted, in most cultures, as experienced and wise and his advice has been sought when new undertakings were planned. This habit has grown up in societies consisting mainly of young people, but with the present day trend toward a disproportionate increase of older individuals in our population there may be a shift of the whole structure of group behavior toward a stronger control by the older people. Will this mean a decrease in revolutionary and radical changes in favor of a slower, smoother and more stable evolution? Should we regard this as the implication in Dublin's statement that we in this country are becoming a "nation of elders"? In other words, with a progressively greater proportion of our population being in the older age-brackets, habituated to established standards of living and able to see the possibilities of disorganization in introducing new ones, will our oldsters serve as a curb on the adventurous spirit of youth, which sometimes fights for a change merely because it is a new experience? There is no doubt that progress is dependent upon the ability to grow away from the old and develop new methods of adjustment, but healthy progress demands a proper mixture of new ventures and of stability with neither tendency becoming disproportionately predominant.

These considerations do not lessen the importance of further investigations into the organic changes that occur in old age. The studies mentioned above definitely show the need of further search in the fields of biochemistry, the physiology of body fluids, the endocrine system and structural and functional changes in the nervous system. But with the probable lack of a one to one relationship between organic loss and psychological disturbance, new avenues of approach are opened up. We should learn more about the social and psychological factors operative in the production of the disturbances of adjustment in old age. It is mainly on the basis of these that we can hope to build programs of prevention of psychogenically produced, reversible disturbances in normal and pathological senile states. Furthermore, it would be well to remember that this should be done for two reasons: (1) because the increase in the number of old people also increases the number of patients coming from this group, the methods of treatment and care of these patients and attempts at their readjustment will have to be improved as a matter of practical necessity; (2) because the proportion of older people in the general population is increasing, thereby producing a change in the orientation and interrelationships of the group, our whole structure of social organization will have to be changed in relation to the interests, attitudes and

needs of human beings at this age level.

The present symposium is offered as a modest example of what can be done along the various lines of research in this field. If it gives the impression of being only a beginning and of dealing with isolated problems, we must stress the point that, as affairs stand at present, we are not in a position to tackle the problem as a whole, but must be satisfied with chipping off fragments of the wall which hides the answer to this perplexing problem of the physiology and pathology of old age. As such, we offer to you this cross-section of the work that is being carried on in our state hospitals in a field which, at present, is as inadequate in exact data as it is rich in needs and possibilities.

Worcester State Hospital.

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The Memory Function in Psychoses of the Aged

DAVID SHAKOW, M.A., MARJORIE B. DOLKART, A.B. *and* ROSALINE GOLDMAN, M.A.
Worcester, Massachusetts

Mr. Shakow received his M.A. in psychology from Harvard University in 1927. Since 1928 he has been Chief Psychologist at the Worcester State Hospital. He is a Fellow of the American Orthopsychiatric Association and the American Association of Applied Psychologists; a member of the American Psychological Association and the American Psychopathological Association. He has published various papers on psychopathological and psychological topics.

Mrs. Dolkart received her A. B. from Smith College in 1934 and has done graduate work in psychology at Clark University and at Radcliffe College. From 1936 to 1941 she was at the Worcester State Hospital in the position of Psychometrist and Research Assistant. At present, she is engaged in the private practice of Clinical Psychology in Chicago.

Miss Goldman received her M.A. from Clark University in 1935 and has acted as Research assistant at the Worcester State Hospital. She has been Psychometrist at the Boston Psychopathic Hospital since 1936. She is an associate member of the American Psychological Association.

Memory disturbance has long been recognized as a cardinal symptom of the psychoses occurring in the aged. For this reason it is all the more remarkable that the importance of age itself as a factor in memory has been so neglected. It is obvious that before a judgment can be made as to memory disturbance in a psychotic person it is important to know the effect of age on this function in the normal. The present study is concerned with an attempt to consider this problem. It follows naturally on the work of Wells and Martin[4] in the standardization of a memory test. These authors established the first adult norms which were based on a group of 50 adults with a mean age of approximately 21.

For a number of years the Psychology Department of the Worcester State Hospital has been occupied with collecting data on memory function in the normal aged. Whenever possible, examinations were given to adults, both male and female, between the ages of 15 and 90 in order to obtain material for establishing norms by decades for certain aspects of memorial functioning. The present report is concerned with groups of aged psychotic patients: psychosis with cerebral arteriosclerosis and senile psychosis. As a control, a selected group from the normal subjects just mentioned is used.

Technique

The test employed was an elaboration of the Memory Test developed by Wells. It consists of a number of different types of items which may be divided into two major groups: old recall and new recall. The *old recall* section includes such items as: personal information (e.g., where born, age, etc.), current information (who President, who King of England), school information (feet in yard, pints in quart), alphabet, counting backwards from 20-1, naming the states for familiar towns (Lowell, Providence) and naming

of common objects (pencil, spool). The *new recall* items include: sentence memory, repetition of figures forward and figures backward, recognition memory (recognition of pictures previously exposed when included with a group not exposed), and memory for ideas (a 50-idea story). The last item is an addition of our own. Two items of the original test which we did not find satisfactory were omitted, viz., substitution and paired associates (unfamiliar-town states).

Scoring is by points, depending upon the particular item. In some, both speed and accuracy are considered; in others, merely accuracy.

The test, as it stands, defines memory quite broadly and has obvious limitations, as would any test which attempted to determine the efficiency of a complicated function like memory in some thirty minutes. The material is essentially of a non-affective nature; no attempt is made to study the very important affective aspects of memory. It must be understood, too, that one is here dealing with a practical tool for use under clinical conditions and not with the experimental or qualitative study of memory. These are problems for further study. Within its limits, the test is fairly adequate, and until a more satisfactory test is available, can be of considerable usefulness. The major lack, perhaps, is the absence of some test of delayed recall. Due to the complex problems involved in the testing of delayed recall—the extreme difficulty of keeping both intervening time and activity constant—we decided not to include such items when making the changes in the original test. However, we did meet, as already indicated, a lack recognized by Wells, viz., an item testing memory for a connected train of thought.

Standardization

Although time does not permit an extended discussion of the important problem of the selection of the normal population, it seems necessary to comment upon it at least briefly, before presenting the results from the psychotic groups. There are certain criteria of adequate sampling which have to be met in a problem such as ours where we wish to set up norms by age. These are the elimination (partialling out) of age, educational level, occupational level, intellectual level, etc., as determinants. The problem is made considerably more difficult by the differing standards with respect to the mentioned factors which must be considered when dealing with a group containing persons of such divergent ages as 15 and 90.

In the present study, care was taken to obtain a selected sample for each decade based primarily on the criterion of education since this seemed the most satisfactory one available. From statistical data of various kinds the average schooling for the different decades in the general population was determined and the study group selected to meet these criteria.

At first it was planned to use Stanford-Binet vocabulary achievement (a measure of intellectual level) as an additional selective factor, but it soon became evident that vocabulary as a function did not remain stable through the decades (in fact it only stays at approximately the same level through the sixth decade and begins to decline from there on).

Although our final normal sample is not large—192 cases—it is the selective residue of an original group of approximately 500 who were examined. The others were dropped because they did not meet the established criteria for one reason or another. Though exception may be taken to the small number of persons comprising some of the decade groups, it is probable that we have a relatively pure sample of normal persons at the various decade levels. A certain degree of check is obtained from comparing our groups with two other studies using adults: Shakow & Goldman[2] and Weisenberg, Roe & McBride.[3]

With respect to the psychotics, the problem of sampling is similar. It was necessary to be sure to select from both the psychotic groups—senile psychosis and psychosis with cerebral arteriosclerosis—representative samples which might legitimately be compared with the normal group. The question arose as to which criteria to use. It was obviously essential to match for age, i.e., to get psychotics of the same age level as their respective normals. Then the groups should be matched for intellectual level. The two criteria available for this purpose were education and vocabulary level. Since education

is only in part an indicator of intelligence level, a combination of the two seemed most advisable. However, on examining our psychotic groups we realized that it was not possible to use the vocabulary level since vocabulary appeared to be a function affected considerably by the psychosis. (This point will be discussed at greater length later). We were thus thrown back on educational level as the primary selective criterion with occupational level used to some extent for corroborative purposes.

As will be seen from the graph, the two psychotic groups come fairly close to the normal in educational level; they are, if anything, a little higher. They may, therefore, be taken as fairly comparable samples for the ensuing discussion. The inference which we wish to be drawn here is that at the various decades, differences which are found between normals and psychotics are related to the psychosis, rather than to age or intellectual level.

A further desideratum for the psychotic groups is that they should be good samples of their respective psychoses. Two problems are involved here: first, how good a sample of the Massachusetts population of these psychoses are the Worcester groups, and, second, how good a sample of the Worcester populations are the present test populations.

With respect to the former question, an important point is involved because of variations of style in diagnosis which are occasionally found in mental hospitals. This may be especially true with respect to two groups so difficult to distinguish diagnostically as psychosis with cerebral arteriosclerosis and senile psychosis. A comparison of our data with those of Massachusetts for the 10-year period, 1929-1938 inclusive (the Massachusetts figures include Worcester's), indicates a fairly close correspondence in the populations of the two types of diagnosis: seniles 65 per cent and 72 per cent, for Worcester and Massachusetts respectively, and arteriosclerotics 35 per cent and 28 per cent, respectively. Apparently, the Worcester State Hospital uses the diagnosis "senile psychosis" somewhat more frequently than the state as a whole, whether because of differing diagnostic criteria or because of a variation in the patients sent to us. However, the difference is relatively small and may be disregarded in the present context.

The second question is: how good a sample of the Worcester population of these two diagnoses was studied. Since we attempted the examination of practically all the patients of these groups during certain periods, whether at physicians' requests or because of our interest in obtaining data, the original group with which we worked is quite likely to have constituted good samples of the Worcester State Hospital population. However, our experimental group does not include all the patients examined by us. There were a considerable number who were in a condition which prevented any examination from being attempted. There were also numerous others, who although examined, gave results which we could not consider "representative," i.e., there were temporary factors interfering with cooperation and a satisfactory attitude towards the examination; these therefore had to be eliminated. There are thus left in our experimental group only those patients who were able to cooperate satisfactorily and of whose examination results we could be fairly certain. It is evident, then, that our groups are not fair cross-sections of the psychoses as a whole, but represent rather a fair sampling of the examinable and cooperative patients. It is therefore likely, though not necessarily true, that any differences obtained between our present groups and normals are minimal ones and should be considered as such.

Because of the small number of cases in some of the decades of the psychoses, as they ordinarily distribute themselves, we have limited ourselves to those decades in which these psychoses are most characteristically found.

The mean ages of the three groups are similar. Educationally, the levels are also similar, though the psychotic groups are somewhat higher (Cf. Graph). A study of the occupation distributions for the three groups (according to the U. S. census classification into seven categories) reveals no great discrepancies among them although the distributions in the classes are somewhat different.

The hospitalization period (time between first admission and examination date) means

are 21.4 months for the senile group and 14.2 months for the arteriosclerotic group. The means do not describe the situation adequately, however. Actually, 58 per cent of the arteriosclerotics and 54 per cent of the seniles have hospitalization periods below 6 months, the great majority of these being one month or less.

Results

Having established the relative adequacy of our samples, we may now turn to the consideration of the comparative memory data obtained from the three groups. Throughout, the factor of age is partialled out by making comparisons across decades. The essential data are compared in the graph before you, which gives the mean levels for old recall, new recall, vocabulary and education by group and by decades. Although we are here limiting ourselves to means, we are doing so only because our time is brief. In some respects a good deal more is learned from, and many important differences appear in, scatter diagrams, which we shall consider in our final report. No attempt will be made to consider statistical significances, etc. We are only interested in presenting trends here.

It must be recognized, of course, that these curves are not life curves, but rather age averages. They suffer from the weaknesses which such averages have in representing the effects of age; they may be taken only as trends since there is wide over-lapping between successive ages.

Let us consider vocabulary first. The normal curve shows a flatness through the 50's and a drop beginning in the seventh decade. (The adequacy of the results obtained from our sample is corroborated by the other two studies represented by the symbols at the various decade levels). Although, as has already been indicated, we had planned to use vocabulary level as an additional criterion of selection, the curves will show why this was not possible. Apparently, vocabulary performance is considerably disturbed in both psychotic groups beyond what would be expected from age alone. The normal level in the later decades lies at approximately 50, while the psychotic levels are at about 40 words. This result offers additional evidence[1] of the dangers of using vocabulary as an indicator of original mental level even in the normal aged, let alone the psychotic aged.

An examination of the downward trends of the curves for old recall and new recall indicates that memory is a function which is definitely affected by age in normals, less for old recall than for new recall. It will be seen that the curves in the psychotic groups for both kinds of recall are at lower levels than their respective normal curves. The seniles are considerably below the arteriosclerotics at the same age levels. This poorer performance by the seniles is found without exception in all twelve items of the test.

Although there is a consistent downward trend in the normal curves, the curves for the two patient groups show no consistent trend with age. Either there is no downward trend with age or there are slight rises. No emphasis can be placed on the reversal in direction of the changes, since they are without doubt not statistically different. The lack of trend may perhaps be a function of the greater variability which is found in psychotics generally, and for this reason may not be important from the present standpoint. (It is not a matter of the lesser number of cases since the psychotic groups generally have as many or more cases than their respective normal groups). If this finding, viz., that there is no downward trend with age in the psychoses, should hold up on further investigation, and if this were not due to greater variability, then one would be led to speculate as to the possibility that those persons who do not succumb to psychosis early, whether arteriosclerosis or senile psychosis, are the ones who have the fundamentally greater capacity for preserving their functions. That is to say, a person who develops senile psychosis at 80 is an individual who at 80 has preserved his functions as well as the person who develops the psychosis at 60. It is as if there were a threshold level of preservation of function and when that threshold is reached the person is ready to succumb to psychosis. This suggestion is not to be taken too seriously. It is merely a hint for further investigation and has important implications for theories of resistance, if true.

A question of considerable significance for the psychiatric evaluation of an old patient is raised by these results. Throughout the

psychiatric literature, emphasis is placed on two points, viz., on the marked memory disturbances in these two psychotic groups and on the greater disturbance of new, as compared with old recall. If the present findings are at all valid and if the present test may be taken as representative of the memory function as a whole, there is actually a relatively small difference between the psychotic groups and the normals of their respective decades—a surprising finding. It will be seen that *age* is by far the most effective disturber of memory and that psychosis adds only a little to an already marked disturbance of function. Doubt is thus thrown on the generalizations ordinarily made about senile and arterio-sclerotic memory.

One would suspect that these generalizations are not oriented with regard to normals of the same general age level. Rather, the marked disturbances which are ordinarily described are probably taken in relation to a more or less "unconsciously" established norm based on the memory function of the 20-30 year old adult or the older superior person. This conjecture is supported by the fact that the old recall difficulty is generally minimized, the emphasis being on the new recall difficulty in these groups. Actually, our curves show proportionately the same disturbance in old recall as in new recall. However, the curve is considerably flatter in old recall and the difference between functioning at the early adult level is not so markedly different from that in the aged psychotics; in the case of new recall, the curve is much steeper, indicating that functioning at the different age levels is quite different, hence the emphasis on the new recall difficulty.

In respect to these findings, the value of the present material lies in its negative rather than in its positive contribution. It should help to make us more conservative in characterizing as pathological the memory disturbances we find. Senescence apparently takes a great toll and it is illegitimate to hold senility accountable for this. (These remarks must, however, be taken with the reservation made earlier, viz., that our group is presumably a sampling of the better patients).

The relatively greater disturbance of vocabulary, which was surprising to us (especially because of the great emphasis which has been placed by various authors on the resistive powers of this function), leads to another question. Is the poor performance in memory due to some generalized aphasic disturbance to be found in these patients, rather than to a difficulty in impression or retention, and is this aphasic disturbance the fundamental basis for whatever memory difficulty we have found? This question cannot be answered from our data, but some evidence is found in the fact that verbal material (sentences and ideas) is more severely affected than digits (both backwards and forwards). Is the difficulty mainly one of impression, or is it one of providing the proper associations?

A few words might be said about the correlation coefficients. In the interrelationships between old recall, new recall, and vocabulary the seniles have consistently the higher

	N	*AS*	*S*
OR/NR	.49	.46	.66
OR/Voc	.62	.64	.79
NR/Voc	.56	.31	.76

coefficients, a finding which would jibe with the concept of a more generalized disturbance or deterioration in this group. In arteriosclerosis, on the other hand, the relationships are the lowest (not much different from the normal, however, in two of the relationships) which would agree with the more sudden and selective disturbance in this group.

An important question arises as to the effect of length of hospitalization on memory functioning. The correlations are practically zero (OR: .00, .05; NR: .03, .10), indicating no sign of relation between the length of hospital stay and achievement on the test.

The problem as to what help the memory test can be in differential diagnosis between arteriosclerosis and senile psychosis is a difficult one to answer. In addition to the lower means in seniles, there seem to be a few items on which there is a more marked differentiation, but these would need further study before any definite statement could be made.

Conclusions

From a study of certain aspects of the memory function in a representative sample of normal adults from the second through the ninth decades, norms are made available for the evaluation of memory in two psychoses of the aged: psychosis with cerebral arteriosclerosis and senile psychosis. The results indicate consistently, but not markedly, poorer performance of the psychotic groups when compared with the normal. Of the patient groups, the seniles are invariably poorer than the arteriosclerotics. With respect to institutionalization, the correlations indicate that this factor has no effect on performance. In addition, the present study has raised two questions as to the nature of the disturbance: (1) a qualitative one—Is the disturbance of memory secondary to a generalized aphasic difficulty? (2) a quantitative one—Is the disturbance due to psychosis as marked as has ordinarily been considered? With respect to the first, the question can only be left at present. With respect to the second, our evidence would indicate that the disturbance is less marked than has been generally accepted, and appears to be mainly due to age.

Worcester State Hospital.

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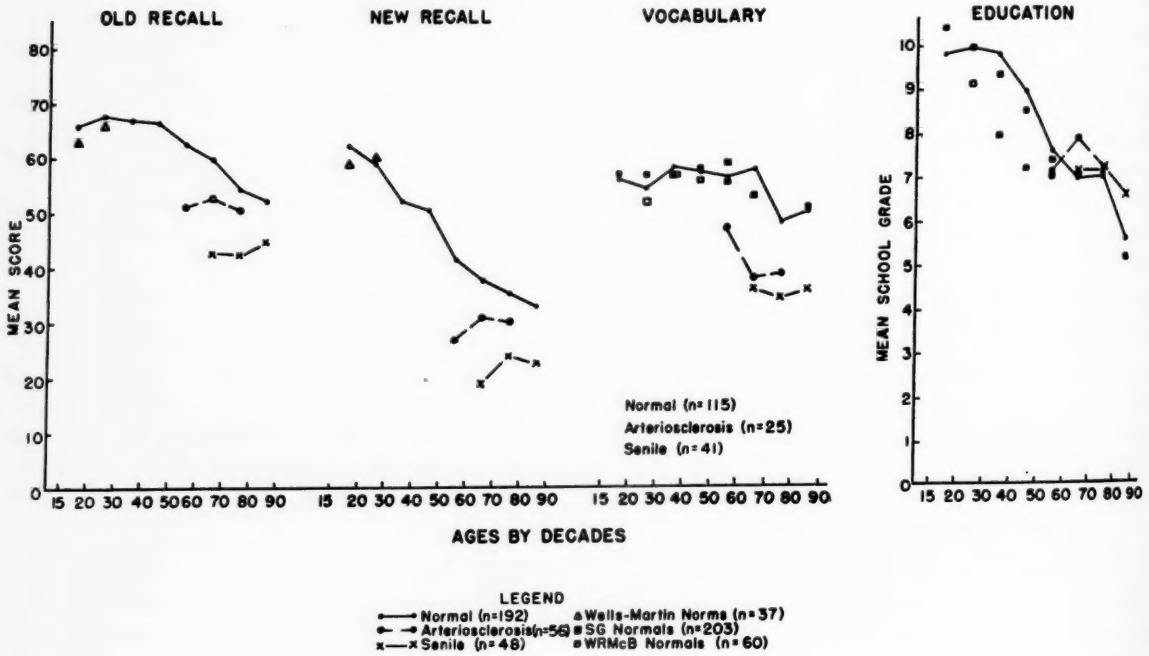
DECADE MEANS FOR OLD RECALL, NEW RECALL, VOCABULARY, AND EDUCATION OF PSYCHOSIS WITH CEREBRAL ARTERIOSCLEROSIS, SENILE PSYCHOSIS, AND NORMALS



The Origin of Senile Psychoses: Neuropathologic Factors and Factors of a more Personal Nature

D. ROTHSCHILD, M.D. *and* M. L. SHARP, M.D.
Foxborough, Massachusetts

Dr. Rothschild graduated from McGill University Medical School in 1922. At present, he is Pathologist and Director of Research at the Foxborough State Hospital and Instructor in Psychiatry at the Harvard Medical School. He is a member of the American Psychiatric Association, the Boston Society of Psychiatry and Neurology, the Massachusetts Psychiatric Society and the Massachusetts Society for Research in Psychiatry. He is a Diplomate of the American Board of Neurology and Psychiatry. His writings include papers on the blood-cerebrospinal fluid barrier, Alzheimer's disease, senile psychosis and dementia paralytica.

Dr. Sharp graduated from Tufts Medical School in 1932. He became associated with the Foxborough State Hospital in February, 1934, becoming a Senior Physician in 1937. He is a member of the American Psychiatric Association, the Massachusetts Psychiatric Society, and the Massachusetts Society for Research in Psychiatry.

In etiologic considerations of senile psychoses, it is generally taken for granted that the immediate cause of the disorder is represented by certain well known changes in the tissues of the nervous system. This traditional belief leaves a number of problems unsolved, and its complete validity may therefore be questioned. Changes which are similar qualitatively to those found in senile psychoses are observed in normal senility and, as pointed out previously[1] it has not been possible to establish consistent quantitative differences which would explain why some old persons develop a mental illness and others do not. Furthermore, within the psychotic group there are serious discrepancies between the cerebral lesions and the mental phenomena which cannot be accounted for on anatomic grounds.

These inconsistencies have been recognized by other workers, but as a rule the whole problem is avoided or abandoned as inexplicable. Yet an explanation lies close at hand, though in a direction which has received little attention. Too exclusive preoccupation with the cerebral pathology has led to a tendency to forget that the changes are occurring in living, mentally functioning persons who may react to a given situation, including an organic one, in various ways. When this is taken into consideration, the problem no longer seems puzzling, and at the same time a broader view of senile psychosis emerges, one in which the qualities of the living patient now appear as an important factor in the origin of the disorder.

Before presenting data in support of this conception, it may be recalled that in senile psychoses the neuropathologic process consists of diffuse degenerative changes of the nervous parenchyma, chiefly atrophic changes and shrinkage of the cerebral tissue, with a dropping out of nerve cells singly but diffusely, and peculiar argentophile lesions of the gray matter known as senile plaques. The alterations which occur in representative cases will be illustrated later, in order to show that there are wide variations in the amount of damage. The relation of such quantitative features to the severity of the mental disturbances will receive special attention in the following cases.

Case 1—A man, aged 67, was admitted to the Foxborough State Hospital in May, 1928. The family history was of no significance. The patient had a grammar school education and had worked in many positions, including that of salesman. He was married and had one child. His married life was unsatisfactory; a divorce was obtained after twelve years. He was described as a spoiled child and was always regarded as "a great disappointment to his family." After his divorce, he lived with another woman, but he soon returned to his mother, on whom he depended. He smoked excessively, but was not alcoholic. The present illness began gradually. The patient aged rapidly during the last few years. His efficiency at work decreased and he was reduced to simple, odd jobs. About a year ago he was reported as acting queerly. He was suspected of setting a fire in his house and some months later another suspicious fire occurred. His mother died six months before his admission to the hospital, and He began to expose himself to children. He became childish, irritable and somewhat abu-

thereafter he got into greater difficulties. sive in his talk. He told boastful stories about himself and showed very poor judgment in attempting to sell his property.

Examination—The patient was quiet and slightly euphoric. He was partially disoriented as to time. His memory showed considerable diffuse impairment. A slight tendency to fabricate was noted, and insight was entirely lacking. There was a systolic murmur at the apex and base, and the blood pressure was 185 systolic, and 100 diastolic. Laboratory observations, including examination of the spinal fluid, yielded normal results.

Course—For several years the patient displayed a picture of mild to moderate general delapidation. He was able to do simple work under supervision. He gradually grew more forgetful and somewhat confused. Increasing weakness and emaciation were noted, and he became bedridden in May, 1936. He was then completely disoriented. His memory was greatly impaired and he was noisy and restless. There was incontinence of urine and feces. He grew progressively weaker and death occurred on December 17, 1936.

Gross Pathological Observations—The lungs exhibited bronchopneumonia. The heart weighed 295 gm. Considerable thickening and calcification of the aortic valve was observed. Mild coronary sclerosis and moderate aortic sclerosis were noted. The brain weighed 1350 gm. The basal vessels presented a few small atheromatous patches. There was slight atrophy of the frontal and temporal convolutions and the lateral ventricles were somewhat dilated.

Microscopic Examination—With the Nissl stain the cerebral cortex of the frontal and temporal lobes displayed a slight diffuse loss of nerve cells. Some of the neurones were pale and shadowy and others contained lipoid accumulations. There was mild glial proliferation. In figure I these changes may be compared with sections from a normal brain and a brain showing severe senile alterations. In one or two of the larger basal arteries atheromatous lesions were noted, and a few of the smaller cerebral vessels were slightly thickened. Two tiny acellular areas were observed in one section. The Dieterle-Neumann modification of the Hortega stain and the Perdrau stain failed to reveal senile plaques in the brain (Fig. II).

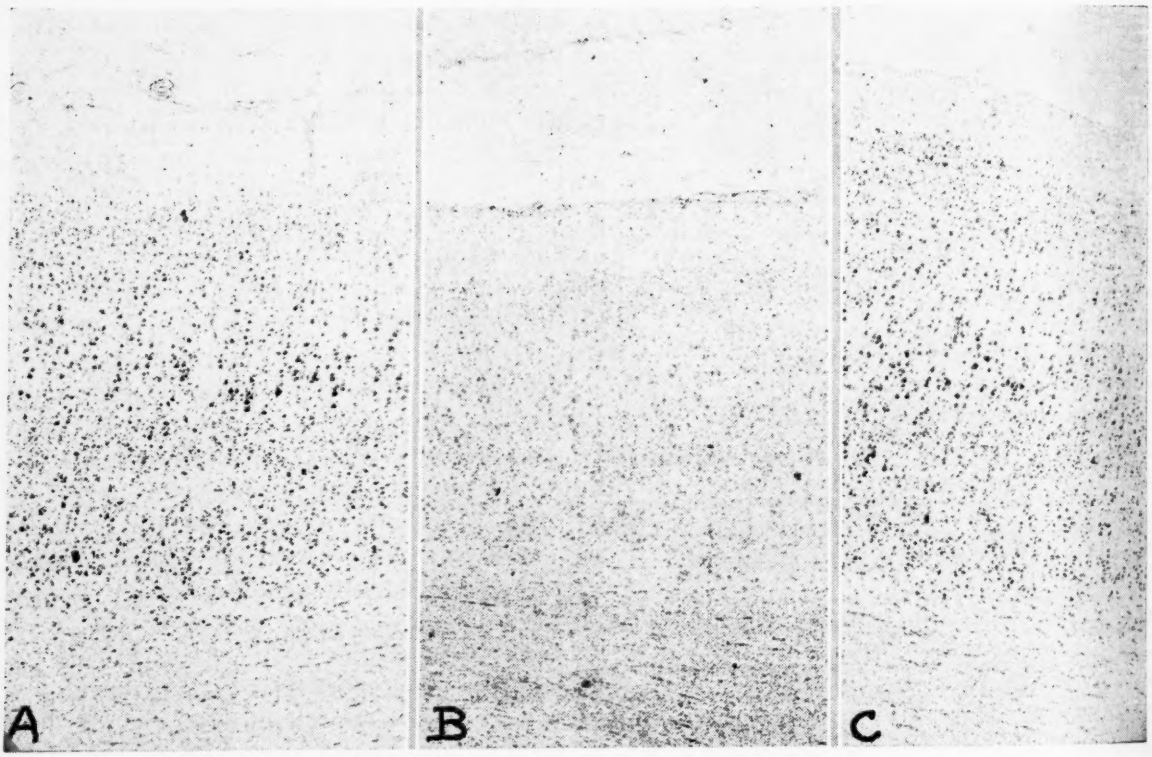


Fig. I.—A, section of the cortex from case 1, showing very slight cell changes without distinct shrinkage. B, section from a senile brain showing severe shrinkage and loss of nerve cells. C, normal control from the brain of a woman, aged 55. Nissl stain; x 35.

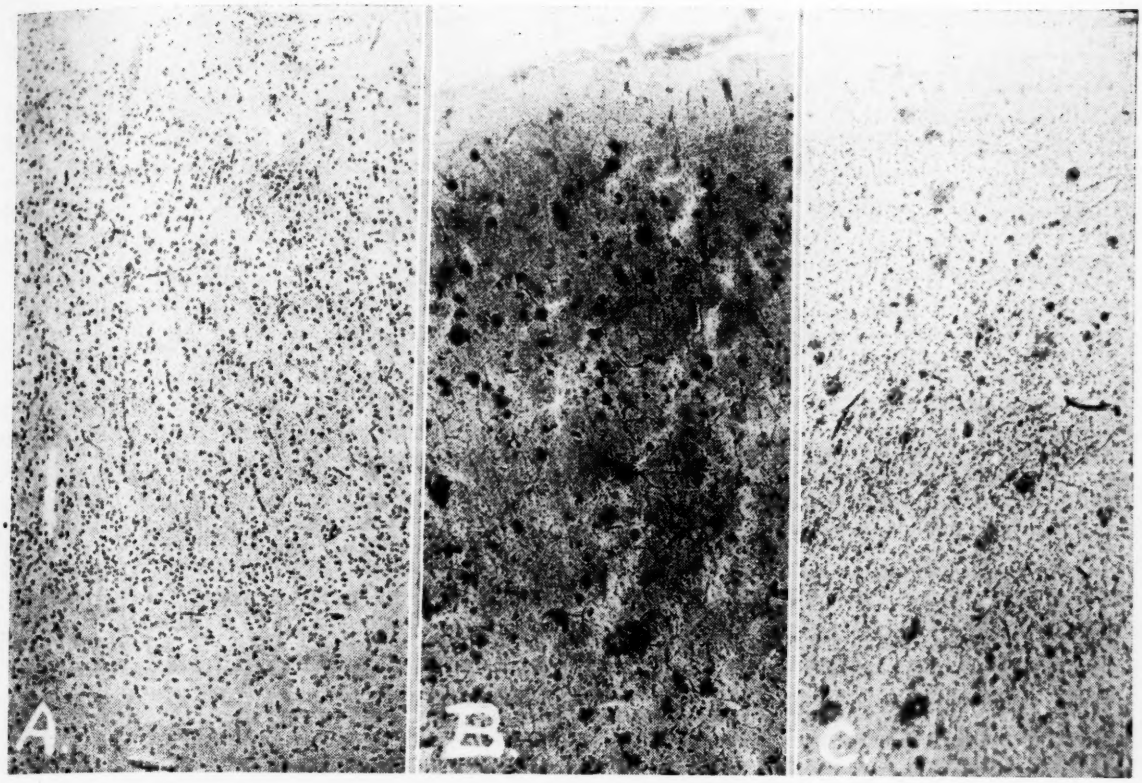


Fig. II.—A, section from the cortex of case 1, showing the absence of senile plaques. B, large number of senile plaques in a brain with severe senile changes. C, section from case 5 showing an abundance of plaques in a person who failed to exhibit clinical evidence of a senile psychosis. Dieterle-Neumann modification of the Hortega stain.

Comment—In his well-known study published in 1927, Grunthal[2] claimed that there had been no well authenticated example of a senile psychosis in which senile plaques were lacking. A scrutiny of the present case suggests that this view, which was previously in accord with our experience,[1] is no longer tenable. The vascular changes were too unimportant to account for the mental disorder, being no more than one might find in the brain of any old person. The illness began insidiously in the middle or late sixties, with moderate intellectual impairment and deterioration of habits in the foreground; it progressed very slowly but ultimately led to a state of profound mental deterioration and death at the age of 75. This picture is typical of a senile psychosis. The slight diffuse degenerative changes were consistent with such a condition, and despite the absence of senile plaques, no other diagnosis seems possible. It is, therefore, interesting to note that Grunthal[3] has recently revised his original views; he now believes that genuine cases of senile dementia may, on rare occasions, fail to show plaques.

However, the present case is not reported primarily because a special type of senile lesion was lacking. The point to be stressed is that the cerebral changes in general were extremely mild, certainly well within the range of alterations found by Gellerstedt[4] in normal senility, and at the same time the mental disturbances were severe, at least in the latter part of the illness. This indicates a marked lack of resistance to cerebral damage. With his inadequate personality, the patient was highly vulnerable mentally, so that he broke down in the face of damage which a more robust personality could readily have withstood. In this sense, one may consider personality factors of leading importance in the production of his psychosis. A similar striking discrepancy between anatomic and clinical changes which becomes understandable in the light of the patient's make-up is illustrated in the following case.

Case 2—A. K., a woman, aged 79, was admitted to the Foxborough State Hospital on November 4, 1937. The patient had been of

low intelligence from the beginning, probably belonging to the feebleminded group. She led a sheltered life with her family, but was able to do some of the simple household tasks. She was described as fussy, jealous, opinionated and complaining. Eighteen years ago she had an attack of grippe, following which she showed ill-defined mental disturbances for several weeks. The present illness began insidiously one or two years before admission, with gradual failure of her physical and mental capacities. She began to express vague ideas that people were talking about her. She became untidy in her habits, and finally grew depressed, fearful and restless. Examination disclosed an agitated picture with overtalkativeness, incoherence and irrelevance, partial disorientation for time and place, an impaired memory, and a very defective grasp of general information. Physically, she presented a general senile appearance. The blood pressure was 160 systolic and 65 diastolic. For a few months she was somewhat less agitated, but in May, 1939, it was noted that she was completely disoriented, incoherent, depressed and irritable. She became bedridden and developed contractures and pressure sores, and death occurred on August 15, 1939. On histologic examination, the cerebral cortex showed only a few widely scattered senile plaques. The brain weighed 1110 gm. It displayed a moderate degree of atrophy, but cellular stains revealed merely mild diffuse changes.

In the foregoing case, there were no focal lesions to suggest that the psychosis was on a vascular basis and no other somatic alterations that might account for a mental disorder. As in case 1, it would scarcely be possible to make a diagnosis of senile dementia from the meagre anatomic changes. Yet the illness was a severe one and it was typical of a depressed and agitated form of senile psychosis. It is believed that this picture was produced by such slight involvement only because the patient's peculiar personality and defect of intelligence were associated with a high vulnerability to cerebral damage. An earlier indication of her lack of resistance may be seen in the brief mental upset which followed a mild infection.

It is our impression that psychologic stress and strain can also play an important part in the origin of a senile psychosis. One example, which was reported elsewhere,[1] may be briefly mentioned.

Case 3—The patient was a woman, aged 80, who had always adjusted well. In recent years there were mounting financial difficulties, and in August 1933, she was obliged to sell the family home, in which she had lived all her life. Her husband was sent to the town infirmary, while she stayed with relatives. She became very much upset over the break-up of her home. Previously she had been very alert, but she now seemed to "go to pieces" rapidly. She was unable to understand why she had to leave her home. She was irritable and showed an obvious dislike for her new surroundings. Her memory became poor and she grew feeble physically. Finally, she displayed restless and noisy conduct and failed to recognize her relatives. She entered the hospital on January 3, 1934, showing marked intellectual impairment in all fields as the outstanding feature; she rapidly grew weaker and died on March 3, 1934, with signs of bronchopneumonia.

In this case the brain showed typical senile changes, but they were less marked than those observed in most of our senile patients. Yet clinically it was one of the severest cases; in fact, the illness, with a total duration of 7 months, was the most rapidly progressive of any senile psychosis encountered in our Foxborough material. Here again one sees a discrepancy between neuropathologic and clinical phenomena which cannot be adequately explained on an anatomic basis. There is no reason to suppose that senile lesions were suddenly formed in the brain at the age of 80, when this psychosis began. On the contrary, all our knowledge of such changes indicates that they develop very gradually. In other words, senile alterations were probably occurring for years, but the patient remained mentally normal; then a difficult psychologic situation arose and upset the equilibrium, lowering her resistance so greatly that she was unable to compensate for the cerebral damage to even a slight extent, and thus she succumbed to the process with unusual rapidity.

Certain patients with senile psychoses are able to compensate for the cerebral involvement with partial success. Since evidence

in support of this idea has been presented previously,[1] only one example will be given.

Case 4—A patient, aged 72, was committed to the hospital with the picture of a paranoid type of senile psychosis of three or four years' duration. Examination showed that he was orderly, alert and coherent. He expressed outspoken ideas of persecution and mild grandiose ideas. He was correctly oriented, except for a slip as to the year, which he later corrected. His memory was only slightly defective and his grasp of general information was fairly good. After residing in the hospital for a month, during which time there had been no change in his mental condition, the patient developed lobar pneumonia, and died within a few days. The brain showed extensive senile alterations, which were actually more severe than those found in some of the cases with profound mental deterioration.

In this case, the patient was more successful in compensating for the cerebral damage than the other patients, in that he remained relatively well preserved intellectually in the face of such marked anatomic changes. The fact that he showed a paranoid reaction is also of significance, for paranoid mechanisms represent efforts to bridge over some defect. They are attempts at healing, that is, they are compensatory psychologic processes, and it is thus consistent to find them in a patient who exhibited a strong capacity to resist intellectual deterioration.*

Of course, if no mental disturbances whatsoever developed in patients with outspoken senile changes in the brain, complete success in compensating for the damage would be attained. Such an occurrence is by no means uncommon, according to the observations of Gellerstedt.[4] He studied 50 brains from mentally normal persons 65 years of age or older, and in practically all instances a variety of senile alterations were found. To mention only senile plaques, they were present in 42 cases, and what is more important, they were frequently encountered in large numbers, 18 cases showing more than 40 plaques per low power field. This last figure is similar to those obtained in many typical cases of senile psychosis.[1] Our own material does not include brains from normal persons, but several pertinent observations were made in patients with acute psychoses of a non-senile nature. Discussion will be confined to the most striking case.

Case 5—The patient was a man, aged 69, who suddenly had an apoplectic stroke followed by marked confusion and restlessness, with death occurring 16 days later. He was a poultry farmer of fairly substantial means. He had had diabetes for several years, and although he was beginning to show a letdown consistent with his age, he had remained actively in charge of his farm. Post mortem examination revealed cerebral arteriosclerosis and a fresh area of softening of massive size in one cerebral hemisphere. Microscopic examination disclosed diffuse cell changes and a great profusion of senile plaques throughout the brain (Fig. II).

As already pointed out, senile lesions do not develop acutely, so far as is known, but slowly over a period of years. Despite the fact that this patient had more extensive changes than some of our severe cases of senile dementia, he had maintained a state of normal mentality until he was struck down by an entirely different and overwhelming pathologic process.

General Comment

From the foregoing observations it is evident that, at one extreme, a mild cerebral process may lead to outspoken clinical disturbances and, at the other, marked senile alterations may be compensated for with complete success. Of course, there are limits beyond which senile lesions will, no doubt, produce a mental disorder in any person. But within a fairly wide range the alterations do not inevitably lead to a mental illness. In these instances the person's capacity to compensate for the damage seems to be the factor which determines whether or not a psychosis will occur. Here one must reckon with unfavorable traits of personality, innate or acquired, which may be associated with a weak capacity, as in cases 1 and 2, but psychologic stress and strain may also play a role by lowering the patient's resistance,

* White[5] has discussed compensatory and decompensatory psychologic processes in considerable detail, pointing out that there is a parallelism between psychologic and somatic compensatory phenomena. In an earlier paper[1] it was shown that this parallelism existed in a group of patients with senile psychoses.

as in the third case. Apparently, such features represent the essential difference, etiologically speaking, between normal old age and a senile psychosis in certain cases.

The fact that emphasis is placed on these aspects of the problem does not mean that anatomic aspects can be disregarded. Structural alterations are always present, but it is necessary to evaluate their significance in the light of the factors of a more personal nature indicated above. Their role probably varies from one in which they wholly explain the psychosis to one in which they are merely a minor factor. Thus, each case requires individual scrutiny, and instead of focussing attention solely on the impersonal tissue process or on more personal influences, the main object should be to estimate the relative importance of these two sets of forces as factors in the origin of the psychosis.

Summary

Several cases are reported to illustrate the discrepancies that may occur between anatomic changes and mental phenomena in the field of senile conditions. The discrepancies are explained on the basis of differences in the capacity of different individuals to resist or compensate for cerebral damage. In certain cases, defects of personality are associated with such a high vulnerability that unusually slight changes lead to an outspoken psychosis. It is believed that mental stress may lower the compensatory capacity and thereby upset an equilibrium which had hitherto been well maintained. Other persons remain normal mentally in spite of severe senile involvement of the brain. These observations suggest that the qualities of the living person rather than the neuropathologic alterations determine whether or not a psychosis will occur in some cases. The role of the structural disturbances probably varies from one extreme, at which they wholly account for the psychosis, to the other at which they are only a minor factor. A picture of the true situation is revealed, not by isolated consideration of any single feature, but by a scrutiny which seeks to determine the relative importance of anatomic factors and factors of a more personal nature in each case.

Foxborough State Hospital.

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DR. H. BECKETT LANG—NEW ASSOCIATE EDITOR

The Editorial Staff of the Journal is proud to announce that from now on Dr. H. Beckett Lang, of New York, will be numbered among its Associate Editors. Dr. Lang has a long and distinguished record of service starting with his medical apprenticeship at the University of Toronto from which he received his Bachelor of Medicine degree in 1924. Previous to this he had seen service over seas with the Canadian and British forces.

The services we mention include Director of Clinical Psychiatry at Marcy State Hospital and at Pilgrim State Hospital; Acting Medical Inspector of the Department of Mental Hygiene; Superintendent of Buffalo State Hospital; Consulting Psychiatrist to the Southside Hospital; Neurologist to the Vanderbilt Clinic; Lecturer in Social Psychiatry at Millard Fillmore School of Social Work, University of Buffalo; and Lecturer in Psychiatry, Medical School, University of Buffalo.

At present, Dr. Lang is the Assistant Commissioner of the New York Department of Mental Hygiene. His medical affiliations are too numerous to list, but include the American College of Physicians, the American Psychiatric Association and the Association of Military Surgeons. Dr. Lang is also a Diplomate of the American Board of Neurology and Psychiatry and a qualified Psychiatrist in New York State.

Incidence of Abnormal Electroencephalograms in Epileptic Persons over Forty Years of Age

LEON J. ROBINSON, M.D.
Palmer, Massachusetts

Dr. Robinson is Senior Physician at Monson State Hospital. He received his M.D. degree from Boston University School of Medicine in 1934. Upon graduation, he served as House Officer for 18 months at the Boston City Hospital and, following this appointment, as Resident and Assistant Physician at Monson State Hospital. He is a Diplomate of the National Board of Medical Examiners; a member of the International League Against Epilepsy, and the Massachusetts Society for Research in Psychiatry. He is Chairman of the Publication Committee of this latter organization.

The electroencephalogram, or so-called "brain wave tracing" is analagous to the electrocardiogram, and records the electrical activity of the brain by means of the application to the intact skull and scalp of electrodes which lead into an amplifying oscillograph. The normal tracing is readily described as containing alpha and beta waves, the predominant wave frequency being the alpha waves of 8 to 13.5 per second. For convenience the record is called an E. E. G.

Abnormal electroencephalograms have been found in many, but not all, persons suffering from epilepsy, some of the psychoses, brain tumors and behavior disorders, as well as in many relatives of epileptic persons. Before judging an electroencephalogram abnormal, it is necessary to take into account several factors of which the age is one. For what is normal for a child may be abnormal in an adult. The wave frequency is slower during the earlier years of life than during adult life.

Berger[1] found no activity in infants under one month old. Lindsley[2] carried out a study of the development of the brain potentials in relation to age. He studied more than 100 children ranging in age from one month to sixteen years as well as 54 adults from eighteen to sixty-four years of age. In subjects between one and two months of age he found occasional waves somewhat like alpha waves, but of an irregular size and shape and never in rhythmic sequence. At three months the record was similar, but often with nothing but beta-like waves of 25-40 per second, and in a few records of 3 children of this age there were occasional series of 3 or 4 waves with a frequency of 3-4 per second. These appear to be the forerunners of a rhythmic series appearing in these children from one to three months later, according to Lindsley. From the age of four months upward there is a gradual increase in the frequency of waves until the adult frequency is reached at about the age of eight to ten years. In agreement with Lindsley, up to this point, is the report of Smith,[3] who studied 58 normal children whose ages ranged from one day to seventeen years. He disagrees with Lindsley's statement that from ten to twelve years of age the alpha frequency becomes accelerated beyond the adult average. There is agreement on the findings that rhythmic alpha waves first become manifest between three and six months of age with a gradual increase until adult frequency is reached at about eight to ten years. Lindsley suggested that there was an association between the appearance of the first rhythmic alpha waves between three and six months of age and the visual development, as at this time children begin to perceive objects and follow them across the visual field. He stated his records were obtained from over the visual areas in which functional activity may have become manifest. He did not feel justified in hazarding an opinion as to whether the myelinization of projection fibers or some other growth process might be concerned. He suggested that the rise in alpha frequency above the adult range, which he found in the age extending between ten and twelve years, may be related to some of the many physiological changes believed to occur at this age.

Loomis, Harvey, and Hobart[4] studied a few human subjects of varying ages. No alpha activity occurred in infants aged seventeen, seventy-one and one hundred twenty-six days, nor in infants aged twenty-seven months. At twenty-eight months of age there appeared regular waves with a frequency of 7-8 per second while awake; more abundant alpha activity, with a frequency of 8.5 per second, appeared in an infant aged three years eight months.

Bernhard and Skoglund[5] carried out a similar study, but did not draw any definite conclusions from their incompleted data.

Golla, Graham, and Walter[6] plotted the alpha frequencies against the ages and obtained a smooth flat-topped plateau which extended from about ten years to sixty-five years with a fairly abrupt drop at each end.

Provided normal health is retained, the frequency of the alpha rhythm is remarkably constant in each individual and does not vary by more than 5 to 10 per cent over the course of many years.[7, 8, 9, 10, 11]

Davis and Davis[12] (1939) found no change in the tracing taken from a ninety-one year old woman over a period of a year, until this woman in her ninety-second year began to show failing memory, but no evidence of psychosis. At this time there was a change to slower frequencies.

In the animal kingdom, Marinesco and his colleagues,[13] found that the newborn cat showed waves of a slower frequency than did the adult cat under anesthesia with dial. The former was described as having alpha waves of 4-5 per second with a potential between 10-20 microvolts, and the latter as having waves of 7-9 per second with a potential of 50-90 microvolts. In contrast, the newborn guinea pig was described as showing waves between 6 and 8 per second with a potential of 40-80 microvolts. They attempt to correlate the faster activity of the newborn guinea pig, as compared to the newborn cat, with the more advanced maturation of the histology of the nervous system of the newborn guinea pig which more nearly approaches the development of the adult. In a previous work they demonstrated a chronaxie of the motor cortex measuring 1.48 for the extensors of the fore paw of the guinea pig when five days old, whereas it was not even possible to measure the chronaxie in the cat until the sixteenth day.

Jasper, Bridgman, and Carmichael[14] reported that the brain potentials of the guinea pig first appear between the forty-eighth to fifty-sixth day of gestation and that while no definite trend occurs in relation to age the appearance of rhythmic frequencies are best seen over longer stretches of adult records than of young animals. They conclude that the guinea pig brain first exhibits electrical activity at a time "when behavioral indications also point to maturation of higher nervous centers."

Golla, Graham, and Walter[15] recorded their electroencephalographic results in patients with idiopathic epilepsy, the majority having the grand mal type, and found that although 50 per cent of their patients under 40 years of age showed some abnormality in the electroencephalogram, few patients over the age of 40 showed such abnormalities. Furthermore, they have noted at about that age the disappearance of aberrant discharges in the electroencephalogram despite the continuance of seizures. They were unable to find any difference in the clinical diagnoses to account for the change.

Present Study

An analysis of the electroencephalograms recorded from 203 epileptic persons is presented with reference to the age incidence.

The records were divided into several groups. The two main divisions comprised records which were normal and records which were abnormal.

The criteria used for judging a record abnormal consisted of the presence of waves with a frequency of less than six per second or frequent six per second waves, wave and spike forms, or fast spiked waves consistent with grand mal activity. A record was also obtained during a six minute period of hyperventilation. In some cases, patients were unable to hyperventilate either adequately or at all. In the final analysis, records were classified as abnormal, only provided they were so during the resting period.

For the purposes of statistical completeness the records were divided into the following categories: (1) Normal both on resting and hyperventilation; (2) Normal on resting, but abnormal on hyperventilation; and (3) Abnormal both on rest and hyperventilation. The incidence of abnormality was then correlated with the age incidence, with reference to those persons who were under a given age as compared to those over this age. The chronological dividing line was fifty years. We also analyzed our records with reference to the chronological dividing line of forty years.

Results

The number and incidence of epileptic patients who were over fifty years of age was as follows for each group:

1. Ten, or 19 per cent, of 51 patients with normal records both on resting and hyperventilation.
2. Five, or 12 per cent, of 41 patients with a normal record which became abnormal on hyperventilation.
3. Eleven, or 16 per cent, of 68 patients with abnormal records both on rest and hyperventilation.
4. Three, or 7 per cent, of 31 patients unable to hyperventilate, but with abnormal resting records.
5. Two, or 25 per cent, of 8 patients unable to hyperventilate and with normal resting records.

Adding all those with a normal resting record there were 104 persons. Twenty-one, or 20 per cent, were over fifty years of age, and 80 per cent were under fifty years of age. In the group with abnormal resting records there were 99 patients. Of this number, there were thirteen, or 13 per cent, over fifty years of age, and 87 per cent were under fifty years of age.

An analysis of the groups already outlined was then made with reference to the age of forty years as the dividing line.

The number and incidence of epileptic patients who were over forty years of age was as follows for each group:

1. Thirteen, or 25 per cent, of 51 patients with normal records both on resting and hyperventilation.
2. Eight, or 19 per cent, of 41 patients with a normal record which became abnormal on hyperventilation.
3. Thirteen, or 19 per cent, of 68 patients with abnormal records both on rest and hyperventilation.
4. Six, or 19 per cent, of 31 patients unable to hyperventilate, but with abnormal resting records.
5. Three, or 37 per cent, of 8 patients unable to hyperventilate and with normal resting records.

Adding all those with a normal resting record there were 104 persons. Thirty, or 28 per cent, were over forty years of age, and 72 per cent were under forty years of age. In the group with abnormal resting records there were 99 patients. Of this number, there were sixteen patients, or 16 per cent, over forty years of age, and 84 per cent were under forty years of age.

There was a lesser incidence of electroencephalogram abnormality among epileptic patients over the age of forty and fifty years than in those under these ages. There were no differences in the type of epilepsy (whether idiopathic or symptomatic), or in the age of onset, or in the treatment between the younger and older age groups.

Summary

An analysis of the electroencephalograms recorded from 203 epileptic patients was made with reference to the age incidence.

A normal resting record was obtained from 104 patients. Twenty-one patients, or 20 per cent, were over fifty years of age, and 80 per cent were under fifty years of age. Thirty patients, or 28 per cent, were over forty years of age, and 72 per cent were under forty years of age.

An abnormal resting record was obtained from 99 patients. Thirteen patients, or 13 per cent, were over fifty years of age, and 87 per cent were under fifty years of age. Sixteen patients, or 16 per cent, were over forty years of age and 84 per cent were under forty years of age.

There was a lesser incidence of electroencephalographic abnormality among epileptic patients over the age of forty and fifty years than in those under these ages. There were no differences in the type of epilepsy (whether idiopathic or symptomatic), or in the age of onset, or in the treatment between the younger and older age groups.

Monson State Hospital.

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Social Factors in Old Age Psychosis

(Cases admitted for the first time at or over age 70)

ELVIN V. SEMRAD, M.D. *and* CLEMENTINE C. McKEON, M.D.
Waltham, Massachusetts

Dr. Semrad received his M.D. degree from the University of Nebraska Medical School in 1932. At present, he is Assistant in Psychiatry at the Boston University School of Medicine and at Harvard Medical School; Associate on Administrative Staff and Assistant in Neuro-Anatomy, Postgraduate Seminar in Neurology and Psychiatry, Metropolitan State Hospital; and Senior Physician at Metropolitan State Hospital. He is a First Lieutenant in the Medical Reserve and a member of the American Psychiatric Association, the Massachusetts Psychiatric Society, the New England Society of Psychiatry and the Massachusetts Society for Research in Psychiatry.

Dr. McKeon graduated from Tulane University Medical School in 1932. She has been associated with the Metropolitan State Hospital since 1933, in the capacities of Assistant Physician and Senior Physician. She is on the staff of the New England Hospital for Women and Children in Boston and is Psychiatrist at the Waltham Child Guidance Clinic. She has been Certified in Psychiatry by the American Board of Neurology and Psychiatry and is a member of the American Psychiatric Association, the New England Society of Psychiatry, the Massachusetts Psychiatric Society, and the Massachusetts Society for Research in Psychiatry.

It is a well recognized fact today that the highest proportion of mental disease occurs not in youth or early middle age, when a breakdown of so-called inadequate personalities would be expected, but in higher age brackets; in other words, in individuals who seemingly were able to meet life's demands until broken by the added burden of advancing years. Dr. Neil A. Dayton in his recent book, *New Facts on Mental Disorders*, graphically demonstrates this point[1] and indicates that the peak is reached in the 80-89 group where the admission rate is 19 times as high as that of the 10-19 group in males and 18 times as high in females. This has stimulated a great deal of interest and investigative work in psychiatric circles.

Not only is the above true, but it is interesting to note that the old age group, that is 70 +, of itself has shown a progressive increase in the admission rate since 1917. This is indicated by Plate I, which was charted from figures obtained from Dr. Dayton through the Department of Mental Health. As will be noted on this plate, while the 90 + group shows no remarkable rise from 1917 to 1939, a definite rise is clearly demonstrated in the 80-89 group and is very outstanding in the 70-79 group.

Another item of interest to us is the fact that Massachusetts has a higher percentage of first admissions over 60 than any of the New England or Middle Atlantic States. Plate II is compiled by sex in these various states from figures obtained from the Department in December, 1939.[2] Difference in commitment laws may play some role in this discrepancy.

All three of these items, namely, the staggering number of old age cases, the fact that this number is steadily marching upwards and the possibility that Massachusetts may have a higher per cent of admission rate than her neighboring states—were destined to precipitate interest and speculation as to what the possible factors may be.

It has been suggested that the span of life has been increased, and that therefore mental illness associated with old age should be expected to increase. It is obvious, however, that this alone is an inadequate explanation. Is it because, through the years, the community has become less and less tolerant of mental aberrations in the aged? Is the problem likely to be a purely economic one, or is it to be resolved on the basis of physical breakdown of the organism?

For this communication we attempted to obtain some specific data regarding the pos-

sible social factors and selected a group of patients at the Metropolitan State Hospital who were admitted to mental institutions for the first time at the age of 70 or over. With the help of the Social Service Department* it was possible to contact relatives, friends, and various organizations and to collect information covering the factors here described. Fourteen cases (4 M, 10 F) were studied, statistically classified as: Psychoses with Cerebral Arteriosclerosis, 8; Senile Psychoses, 5; and Manic Depressive, Manic, 1. The Social Service Department made a total of 77 contacts for the entire group.

The average age on first admission was 71.9 years with range from 70 to 82, and the average duration of hospital stay to the date of this communication is 5.2 years, with range from 1 year, 2 months to 10 years, 8 months. Of these fourteen patients, six were married (5 Wid.—4 F, 1 M) and eight were single. They had pursued various occupations, mainly in the lower wage class during the productive period of their lives: 2 music teachers; 2 skilled laborers; 2 housewives; 1 toupee maker; 1 filling station operator; 1 waitress; 2 domestics; 1 nurse (practical); and 1 clerical worker.

Of the group, eight were native born and six were foreign born, the countries of birth being Ireland, 3; England, 1; Russia, 1; and Italy, 1. Of the foreign born, one obtained citizenship through marriage, three remained alien, and in two the citizenship was unknown. The duration of stay in the United States varied from 20 to 60 years, the average being 46.4 years.

All but one were dependent prior to admission, duration of dependency varying in time from 6 months to 30 years, average 9.2 years. Financial plans for old age were made in only three instances—but even these were inadequate. One patient, a waitress and hotel worker, managed to save $1000 which was deposited in a savings bank, but illness and unemployment used up her savings so that she became a public charge one year prior to hospitalization. A second patient, employed as a domestic in private homes, managed to save $4000 before her marriage at age of 50. When her husband was unemployed she used the money for him and his children. He was an ardent union organizer and had told her that when he died the union would care for her by its widow pension. At the time of his death she had $800 left; this she gave mostly to charity. When her funds gave out she became a public charge, five years before hospitalization. The third case, patient L. C., was financially independent by virtue of a legacy left by the family. However she, herself, made no plans for old age. She knew this legacy would fall to her and depended upon it. However, the patient lived almost in dire poverty, the funds being controlled by a brother. The informants believed that this situation had at least a contributory part in the patient's illness.

Six patients lived with members of the family in homes supported by the relatives but only one (E. A.) of these was living with his wife in an original home set-up, the rest were either single, 3; or widowed, 2. Seven patients lived in boarding houses supported by agencies, 3 widowed and 4 single, and only one (J. K., single) lived with members of the family in their home supported by agencies. One patient (L. C.), according to the records of agencies, had two nephews living with her, but they were said to be "fair weather friends." K. S., previously mentioned as the person who had saved $4000 prior to marriage at 50, had four step-children from whom she was estranged because of interpersonal familial difficulties which will not be communicated here in detail, but which are a subject of considerable interest for further research. These observations lend support to the factor[3] of removal of protective support when the original home environment is disrupted for various reasons.

In view of the above statement and with some degree of hesitancy, it seems worthwhile to mention an estimate of the interest shown by those concerned with the welfare of the patient. There were four instances where the relatives had shown remarkably good interest and six instances where they had little or no interest. The evidence for the former is indisputible—for the latter is quite definite in some cases.

Patient M. F. lived at least fifty years in

* Social Service investigations were made by Miss Carmen Meehan, under the direction of Miss Mary Killam, Head Social Worker, of Metropolitan State Hospital.

the locality of her step-brother, who when interviewed claimed he knew nothing about her. The patient herself stated that there was never any great intimacy or confidence between them and that she had never accepted any help from him. Patient L. C. lived with brother who allegedly forced her to exist in dire poverty in spite of a legacy. When attempts were made to contact him he made himself unavailable and has shown no interest in her since hospitalization. Patient J. E.'s son has never come to the hospital to visit his mother because of the fact that he felt "too sensitive" and that it "would kill him to do so." He stated that he lived with his wife's family and could not have his mother with him even prior to her illness; however, he is a professional man and it would seem he could have made some other provisions for the care of his mother. Patient C. L. had so-called fair weather nephews—mentioned above. In the case of patient M. C. the situation is a little difficult to evaluate. She lived with her sister who, like the patient, exhibited psychotic behavior for a number of years. Because their brother had not kept in close contact with his sisters, it was difficult for the neighbors to persuade him that they both needed hospital care. However, when he made a visit he agreed that commitment was necessary.

The interest of the various agencies aiding patients in time of need was very good and there was considerable tolerance exhibited. In aiding people with rather marked personality difficulties a few examples are given: Patient M. D. had a long alcoholic record, appearing before the court on charge of drunkenness 34 times prior to hospitalization. Patient L. E. had been known to various organizations for 17 years, appearing for aid early in this period. At the time she appeared for aid she was very inappropriately dressed, and stated that she was on the verge of a "nervous breakdown." She was diagnosed at a general hospital as having a psychosis and given a poor prognosis, yet she remained in the community. Five years before commitment she complained of being followed by people and taxis, had ideas of grandeur in regard to her abilities on the concert stage. She was seen by at least three physicians who refused to commit her. In the meantime, she had been cared for by an agency during this long period of maladjustment. Patient C. L. had been known to agencies at least four years prior to hospitalization. During this time she was suspicious and hostile towards people, moving on the average of about once a month because of these ideas; three years before, she was found in bed badly gassed because she "forgot to turn off the gas when she got through cooking." Medical aid had been offered her and she had been uncooperative in her treatments.

Other similar instances could be related, but time does not permit. The above summaries suggest the impression that the community is really quite remarkably tolerant; one can not help but ask the question why these people were not committed sooner? Also in connection with community tolerance and agency support, one might raise the question of whether this tolerance adequately compensates or substitutes for the loss of the close and intangible bond of interpersonal family relationships. For the present this must remain a question.

The problems presented to the community by the patients' illnesses, although varied, were predominantly in the nature of asocial acts. These may be briefly summarized as follows: Destruction of property, 2: (M. D.) bored hole in wall and tried to set fire to neighbor's floor; (M. J. C.) broke window when she received no response to rappings on neighbor's door. Self-destructive acts, 1: L. E. was found asphyxiated in her room. This was due to a leak in the gas pipe which the patient refused to have fixed; she gave the landlady assurance that she would not open the gas for cooking purposes but disobeyed this. Unusual sex acts could be demonstrated in only one case; L. M. showed sexual interest in little girls. Homicidal acts and threats, 3: A. P. administered a severe beating with a stick to a fellow patient in the tuberculosis hospital; J. K. came down one night and told his niece that God had told him to go out and kill a neighbor. He ran down to the cellar, picked up an axe and was half way to a neighbor's house when he suddenly stopped, dropped his axe and returned home stating that God had told him not to kill; C. S. threw buckets of water on people under her window, this in response

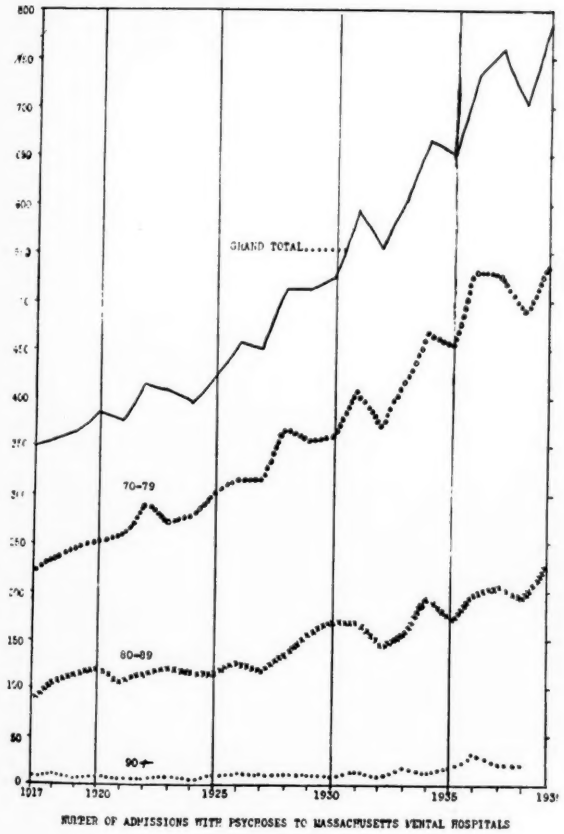
to her belief that these people were calling her names.

Need of excess care, 5: unusual behavior disturbing to the community consisting of turning night into day; vocalizing early in the morning; washing clothes at night; nocturnal wanderings; annoyance of others, due to paranoid delusions of patient, was present in all cases except four.

Some of these individuals, as previously mentioned, showed personality difficulties of long standing before hospitalization varying in time from 4 years to 19 years.

The changes noted in patients by relatives, friends, neighbors or others were: (1) change in alertness, and ability to catch on, i.e., a general slowing up and narrowing of span of interest and fixation of ideas; (2) paranoid ideas; (3) loss of memory; (4) tendency to be overtalkative and reminesce of more pleasant and interesting periods of life; (5) incoherence and irrelevancy at times; (6) tendency to wander at night, work at night, that is turning night into day; (7) confusion; (8) hallucinatory experiences; (9) untidiness in appearance chiefly because of hoarding; (10) irritability; (11) asocial acts; (12) overeating.

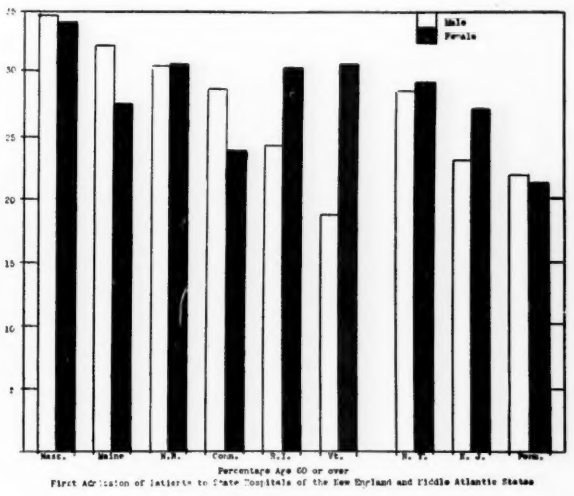
The community dealt with the problems presented by these patients in various ways: Privileges were restricted (L. E.); patients were reprimanded (L. E. and M. D.); humored (J. K.), when humoring failed and the relatives "were scared to death" police were called. Some relatives and agencies showed an unusual amount of tolerance and gave excess care, relatively few seeking medical advice early in the disorder. One case was treated for tuberculosis; one for coronary disease complicated by a vascular accident and aphasia. They were committed from general hospitals. Other patients were treated for various physical ills, mostly with symptoms of cardio-vascular nature (8). Unusual feebleness was relatively rare, occurring only in 3 cases. The details of disease found on admission to a mental hospital will not be communicated here. Final reasons for commitment were: For patient's protection (S. S.); wife's health gave out (E. A.); could not be cared for in general hospital (L. M., L. E., M. A.); too much of a burden (C. L., K. S., C. V.); homicidal acts and threats (J. K., A. P.); interfered with family life (J. E.); confused wandering (L. C.); protest of neighbors (M. D., M. C.).



NUMBER OF ADMISSIONS WITH PSYCHOSES TO MASSACHUSETTS MENTAL HOSPITALS

PLATE I.

Number of Admissions with Psychoses to Massachusetts Mental Hospitals.



Percentage Age 60 or over
First Admission of Patients to State Hospitals of the New England and Middle Atlantic States

PLATE II.

Percentage Age 60 or Over First Admissions of Patients to State Hospitals of the New England and Middle Atlantic States.

Summary

A resume is presented of the community adjustment of old age patients before commitment at age 70 plus; a series of 14 cases is too small to draw general conclusions, but we believe they are of sufficient interest to stimulate further study.

Metropolitan State Hospital.

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Psychiatric Problems of the Aged

BENJAMIN SIMON, M.D. *and* S. HARVARD KAUFMAN, M.D.
Worcester, Massachusetts

Dr. Simon, who is Senior Psychiatrist at the Worcester State Hospital, received his M.D. degree from the Washington University School of Medicine in 1931. He spent several years in London at the National Hospital, as Fellow in Neurology of the Rockefeller Foundation and as Medical Registrar. He is a Diplomate in Neurology and Psychiatry of the American Board of Neurology and Psychiatry and is co-author of an article on multiple sclerosis which was awarded first prize by the New England Psychiatric Society in 1935.

Dr. Kaufman received his Doctorate of Medicine from the Wisconsin University School of Medicine in 1936. He was a resident in psychiatry at Milwaukee Sanitarium and is now Senior Psychiatrist at the Worcester State Hospital.

Of 2400 patients at the Worcester State Hospital, 700 are over 60 years old. It is evident that the care of our aged is and will continue to be an increasingly important and difficult problem. Louis I. Dublin[1] points out that the life span of the human is about 100 years and that if we continue to overcome problems of public health, there should be no reason why the *average* length of a man's life should not reach a maximum of 75 years if we can keep him off the highways. At the present time, the life expectancy of the average healthy live infant at birth is 59.31 years as compared to the 25 years expected of an ancient Roman, or what is more significant, to the 44.6 years expectancy in 1911 in the United States. In 1940, people over 65 years of age comprised 6.3 per cent of our population distribution and at this rate it should be 14.4 per cent in 1980.[1] Most of these individuals continue to make an adequate adjustment in their home environment and present a social rather than a psychiatric problem, as is evidenced by the Townsend group and the fact that many aspirants for political office, at least talk about the essential needs of the aged. We will limit ourselves in this discussion to the maladjusted.

The clinical management of the elderly new admission to a state hospital must be considered from four points of view: (a) the problems leading to commitment; (b) the management of the acute illness, including medical problems, hydrotherapy, occupational therapy, physiotherapy, and psychotherapy; (c) the convalescence or chronicity; and (d) the restoration to society which must embrace both psychiatric and social management including community facilities and those of family care.

What brings the aged person into a state hospital? In the majority of cases the chief complaints fall into certain large groups. There is that huge category of "wanderers," including ancients who have shown increasing personality changes and defects in memory over a number of years, finally beginning to get lost, leaving home at all hours, and being referred by friends or police. It becomes impossible to care for them at home without constant supervision and they are committed when the family tolerance is exhausted.

The second large group includes those admitted primarily for medical supervision, social maladjustment being a secondary factor. They are usually younger and come into the hospital following cerebral insults which have made them mental and physical liabilities.

Numerous varities of commitment problems are found in these groups. Let us consider, for example, the quarrelsome 70 year old patient who developed increasing irritability towards an already senile wife, or the suspicious 65 year old man who had to use res-

traint in social relations with a definitely paranoid wife throughout his married life, but showed greatly increased irritability in his relations with her when the process of ageing became more evident. There is that fairly large group of sex offenders who many times get into difficulties with the law. For example, a 93 year old man could not understand why he could not choose a cow for sexual purposes, if he so desired. An interesting group is the one including those with involutional-like symptoms. The case of a 64 year old hard working man, who, three months after his farewell party upon retiring from the railroad yard, became depressed, somewhat agitated, and developed many ideas of guilt, is one of many examples. There is the not too extraordinary case of a rigid individual who married at 61 and from the first found he was unable to make the adjustment and within 2 months began to show signs of depression and agitation. The entire group of aggressive paranoid seniles is familiar to all of us. Included in this group also must be the alcoholics who are no problem until their judgement begins to show gross defects at 75, the acute depressions in old people that result in attempts at suicide, and acute toxic states seen in the aged who develop an exaggerated sensitivity to ordinary drugs, such as digitalis or even comparatively small doses of bromides.

It is apparent, also, that many elderly patients are admitted to the hospital unnecessarily. First of all, there is a lesser tendency today for children to take the responsibility of caring for their aged parents, and any signs of beginning dotage are enough to cause them to appeal for aid. Secondly, the lack of appreciation and understanding of the problem of senility in the general hospital is sometimes so pronounced that it leads doctors and nurses to take an affronted attitude to irritability, acute deliria, and the generally increased sensitivity of the aged.

What can we do for the newly admitted aged patient? It is necessary, first of all, to treat the acute illness or manage the immediate problems before attempting any discussion of future possibilities. In this, it is highly essential that the proper emphasis be placed on the individual complaints.

For the multitude of medical problems it is ideal to have a separate hospital unit within the hospital where adequate medical and nursing help is available and not over burdened with routine administrative and extraneous psychiatric responsibilities. This is not always practicable, as semi-ambulatory aged patients constitute a problem when they clutter up an already over crowded medical ward. Some line of demarcation must be made, so these patients are segregated in a ward where they are free from contact with younger, more robust patients and their needs are attended to in an in-patient clinic. This should be held not too great a distance from the ward, so that even the more feeble patients can be transported by means of wheel chairs. This system of classification has worked satisfactorily in hospital practice.

The direct medical management includes some of the following routines. Digitalization of cases of mild cardiac decompensation associated with mental signs of disorientation and memory defects, often results in a marked decrease in the mental confusion, even in cases in which the signs of cardiac disturbance are sub-clinical. A high salt diet without gastric lavage is frequently sufficient to quickly clear a bromide psychosis in those individuals who have a greater permeability of the hemato-encephalic barrier. Mild and comparatively safe barbiturates, such as calcium ipral, gr. ¾ BID or TID during the day or at night, will often times greatly reduce restlessness and aimless wandering or destructiveness. It is evident that the elderly patient has a greatly reduced threshold to physical disturbances. The repair of a hernia and hemorrhoids, the application of Unna Paste boots, or the thrombosing of painful varicose veins often gives a more striking picture of relief from a great mental burden than do the same procedures in younger patients. The oscillator bed for generalized and cerebral arteriosclerosis has been utilized but discontinued because it afforded only temporary relief. Adequate doses of thiamin chloride, mgm V BID, or utilization of broader vitamin complexes or specifics have proved indispensable even in cases which demonstrated no clinical signs of vitamin deficiency. Thyroid in small doses, even as low as ¼ to ½ grain daily, has been utilized with some success.

It is always preferable to avoid restraining a restless, confused bed patient. High canvas-sided beds in most cases answer this problem most adequately. If it is necessary to keep a patient in bed but still restrain his aimless activity to prevent injury, a special chair has been devised which is comfortable and protective. Fundamentally, its design is that of an adult high chair, and no longer does the patient have to be tied to a chair with sheets. This serves also as a feeding chair.

One must not forget the careful treatment of emergencies, especially fractures. In most cases, radical procedures are discarded and conservative methods of sand bag immobilization and extension (especially in hip fractures) have proved more comfortable and less cumbersome leading to more satisfactory healing. In young people, good surgical practice calls for nailing in most cases.

Hydrotherapeutic procedures are not outstanding in their direct usefulness, but they have a place. Continuous baths in water just under body temperature have proven more helpful in agitations of senile origin and the response quicker then in agitated patients or other classifications. Wet sheet packs and other more drastic hydrotherapeutic agents are much too dangerous because of the degenerative cardio-vascular changes present and, in any case, are seldom indicated by the behavior of the patients. Light tonic sprays are used in special cases for generalized stimulation.

Occupational therapy, including a good recreational program, is essential not only in establishing a satisfactory hospital adjustment, but as an important link in developing the chain of events from admission to discharge into the community. On the medical wards, unraveling burlap, the making of surgical dressings, or intricate sewing may be carried on by the bed-ridden patients. During O. T. classes, the patient's ability is evaluated and satisfactory industrial placements result. Ward O. T. groups offer activity for the less capable patients in the form of sand papering, sewing, folding sponges, or just unravelling burlap. From these activities many patients are placed in the industrial shops arranging the hair for mattresses; or from folding sponges, they are advanced to folding laundry. In the evaluation shops, specific interests or necessary interests are often discovered. One feeble old man, a cardiac, sharpens razor blades (he is not suicidal), and because of his industrial placement becomes eligible for open ward residence. But all industrial placements do not necessarily have to be of the simple, sedentary type. Many of these individuals are in excellent physical condition and it is found that they improve rapidly in their general attitude when placed back in their former occupations. A robust paranoid senile of 70 made his best adjustment working with the farm gang and living at the farm house. He is now on visit at his daughter's farm. Another, over 90 years of age, was not happy until he was put back with the farm group, and now, he too, resides at home on visit.

For those who cannot be placed in industry, simple recreational procedures help in maintaining some interests. Walks out of doors in good weather, movies in the cooler seasons, and quiet ward parties with simple refreshments, music, and even community singing are well worth organizing.

Physical therapeutic aids are innumerable. It would be prohibitive in a large state hospital to institute body massage for each elderly patient, but its tonic effect is a valuable asset in the general well being of the patient. On the other hand, ultra violet irradiation can be successfully and extensively used during the winter months. In special conditions, including osteoarthritis, infra-red heat or diathermy have proven invaluable.

To be associated with almost any of the mentioned therapeutic activities is the psychotherapeutic management of the aged patient. The essential approach is that of group therapy to develop habit training. In this way the potential avenues of activity within a delimited scope can be realized. This is effected not so much by the physician, but by the combined efforts of all who manage the patient's day under the psychiatrist's direction. Outside of the group, the treatment must be individualized. With many, the evaluation of ideas at a superficial level and simple explanation of the need for social conformity is often the right medicine, if confidence and rappart have been established. Management in the hospital in most cases must assume the color of a kindergarten

where the objectives are to find values in the patient great enough to overcome his primitive trends. On one semi-ambulatory ward the nurse keeps the majority content entirely on the reward and punishment basis. Most of the old men would be lost without a pipe or a large plug of tobacco in their mouths. However, they are many times careless in direction or aim when disposing of excess juice. This infringement of the rules results in the loss of a pipe or plug from 2 days to a week and a month of good behavior means another pipe or extra tobacco. Most everyone smokes or chews on this exceptionally clean ward.

In a few outstanding cases, chiefly of cerebral arteriosclerosis, direct realistic psychotherapy may be utilized with fair results, for the immediate episode, at any rate. It is true that custodial and hospital management is becoming an ever increasing problem. Wards that formerly held deteriorating schizophrenics are being made over to accept the ever enlarging minority group of aged patients. However, the real challenge in the treatment of the aged is the restoration to society through retraining. Once placement outside of the hospital is achieved, it is important in most instances to continue the psychiatric contact on the basis of previously established conditions. Out-patient facilities may be utilized for interviews where patients may be reassured, where they can find genuine, practical aid in the solution of their problems, and where many can be managed by simple suggestive therapy. It is essential in this respect to work with the family, explaining in simple language the etiological factors in the illness, and suggesting ways and means of tolerant management of episodes and situations that, in all probability, will arise outside of the hospital.

As was the case in the basis for commitment, the social milieu and management of the patient becomes once more a prime factor in the return of the patient to the community. In many of these patients the psychosis is a short lived episode and we find ourselves left with an old man or woman with no income or interested relations. They are not doomed to spend their last years in a mental hospital, but through monetary aid from old age assistance funds or public welfare can again establish themselves. Many times living facilities are found for these people in homes where there is a genuine understanding of their problems. Social service investigations have proven successful in securing work for these elderly people at a level that they can manage—Good Will shops, simple caretakers, auxillary day watchmen. If attempts at independent placement are unsuccessful or not advisable, placement in home farms oftentimes proves an excellent change if the patients are chosen carefully. In some cases, just shifting the home situation—removal to other relatives that are more tolerant and understanding—may prove to be the solution. Sometimes the removal of an irritating stimulus—a spouse or child from the home—may make the former living conditions more satisfactory. Too, social service facilities must be utilized in reassuring and re-educating the neighborhood that the patient need not remain in the same condition as before entry into the hospital.

Finally, placement in Family Care homes has proven to be an outstanding aid in two respects: first, as a custodial arrangement for patients who no longer need hospitalization, but need closer supervision than even a home farm could give them. Special homes have been chosen for this treatment and whole colonies of elderly patients have been established. Secondly, the boarding home may be used as a convalescent trial for the patient before he receives his release, a place where he gains liberties yet retains the understanding supervision of the hospital.

As we work with these people we see that our problems are not essentially those of old age, but of persons who have become aged, as a consequence of which they are no longer able to manage, without help and guidance, the routine of living. Tolerance and toleration become strained and as we reduce, bit by bit, the stresses here and there, we may as we acquire knowledge and experience reduce the increasing needs for hospitalization and keep apace with the predicated enlargement of our task. *Worcester State Hospital.*

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Vitamin Studies in Cerebral Arteriosclerosis

W. W. JETTER, M.D., A. M. STIFFLE, M.D., L. TROWBRIDGE, M.A.
and E. TROWBRIDGE, B.A.
Taunton, Massachusetts

Dr. Jetter received his Medical Degree from the University of Buffalo in 1931. After several years of experience as Resident Pathologist and as Instructor and Lecturer in related departments, he became Pathologist to the Taunton State Hospital, which is his present position. He is a Diplomate of the American Board of Pathology; and is a member of the Research Council, Problems on Alcohol, the American Association of Pathologists and Bacteriologists, and the Massachusetts Research Association.

Dr. Stiffle graduated from Tufts College Medical School in 1928. At present he is Clinical Director of Taunton State Hospital. He is a Diplomate of the American Board of Psychiatry and Neurology, a member of the American Psychiatric Association, the Massachusetts Association of Psychiatry and the Massachusetts Society for Research in Psychiatry.

Mr. Trowbridge received his Master of Arts degree in Psychology from Boston University in 1934. He was the holder of the American Scholarship in Psychology at the School of International Studies, Geneva, Switzerland, 1933, and Visiting Clinical Psychologist to the United States Marine Hospital, Chelsea, from 1937 to 1939. At present, he is Visiting Psychologist to the Taunton State Hospital, Psychometrist to the Boston City Hospital, Neurological Service, and affiliated with the Department of Student Council at Boston University. He is a member of the Research Council, Problems on Alcohol and the Massachusetts Psychiatric Research Association.

Mrs. Trowbridge received her Bachelor of Arts degree from Radcliffe in 1938 and her Master of Arts degree in Psychology from Boston University in 1941.

This paper is a preliminary report of a study still in progress which deals with the effects of vitamin therapy upon hospital patients diagnosed as cases of psychosis with cerebral arteriosclerosis. The paper consists of two parts: the first is an evaluation of the Vitamin C and B status of individual patients as studied clinically and chemically; the second deals with the effect of Vitamin B complex therapy upon the intelligence of these patients, as measured by two applications of the verbal part of the Wechsler-Bellevue Intelligence Test.

Fifty cases diagnosed as psychosis with cerebral arterio-sclerosis were selected at random from the records of the Taunton State Hospital. The group consisted of thirty-six male and fourteen female patients ranging in age from fifty-six to eighty-three years. Eighteen of the fifty were bed cases during the course of the study, due mainly to cardiac decompensation. Three of the elderly patients died during the course of the investigation.

Vitamin C

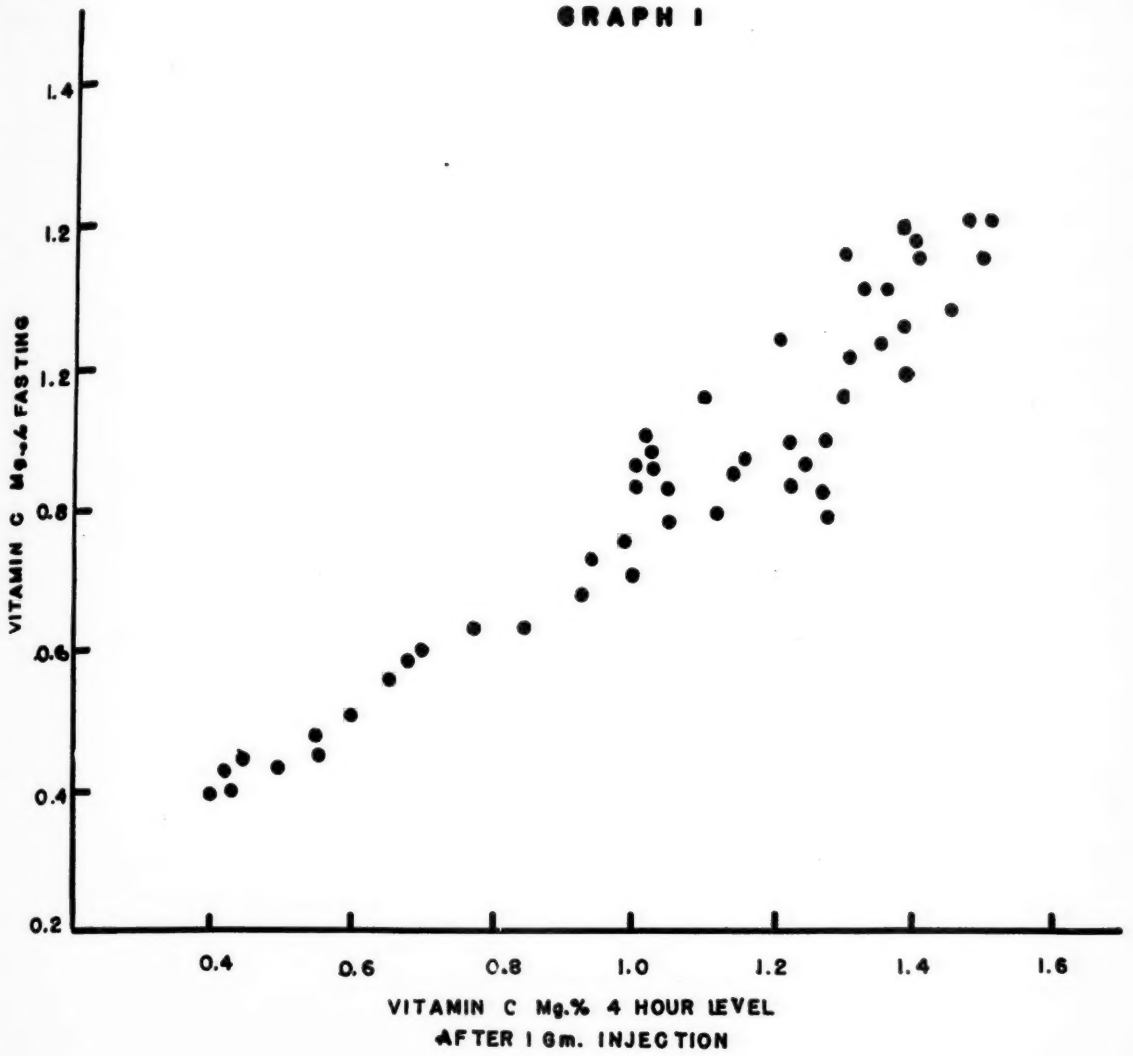
Vitamin C of whole blood was determined according to the method of Pijoan and Klemperer[1] using dichlorophenolindophenol as an indicator. All blood was taken with KCN as a preservative. Following the taking of the fasting blood for its Vitamin C content, one gram of crystalline Vitamin C dissolved in 10 cc. of sterile saline was injected intravenously and the Vitamin C level determined four hours later.

The fasting Vitamin C varied, but no cases were encountered above 1.2 mg. per cent or below 0.4 mg. per cent. The four hour level was increased by 0.1 mg. per cent to 0.4 mg. per cent following the intravenous injection in all cases having an original fasting blood Vitamin C level of 0.5 mg. per cent or over. The four hour level of those cases having a fasting content below 0.5 mg. per cent remained at a constant level in three cases and increased but slightly in the other four cases (Graph 1). On the basis of these results we may say that seven of the fifty cases showed low whole blood levels and gave no evidence of tissue saturation after the administration of 1000 mg. of Vitamin C. In addition, all of the cases were examined clinically for evidence of Vitamin C deficiency by clinical methods for evidence of hemorrhagic tendencies including tourniquet capillary tests. No evidences of abnormality were noted.

During the course of the month's study two glasses of fruit juice were given daily to the seven cases whose fasting Vitamin C levels had been below 0.5 mg. per cent. At the end of a month the seven cases were re-checked and they had levels varying from 0.8 to 1.1 mg. per cent which was considered a normal level.

Vitamin B

Evidences of deficiency of the Vitamin B complex were sought for by clinical observation. Five possible signs of Vitamin B complex deficiency were specifically considered: (1) Glossitis; (2) Atrophy of the papillae of the tongue; (3) Rhagades; (4) Hyperkeratosis of the skin; and (5) Polyneuritis. Of the fifty



cases, ten had glossitis and these were rated on a scale of plus 1 to plus 4. Atrophy of the papillae of the tongue was found in nineteen cases and rhagades was found in ten cases. Twenty-three cases had hyperkeratotis of the skin and this was also rated on the basis of plus 1 to plus 4. No evidence of polyneuritis was found in any of the fifty cases.

More than one of these signs was found in seventeen individuals as follows: eleven showed two manifestations; four showed three manifestations; and two showed all four. None of the cases showed a hemoglobin below 70 per cent and an examination of the blood film showed no evidence of macrocytosis.

Whether the five manifestations searched for are due to Vitamin B complex deficiency is perhaps open to question. None except polyneuritis is specific, but at the same time glossitis is quite suggestive of a B complex deficiency.

Two ounces of Brewer's Yeast were administered in cocoa milk daily to thirty-one of the fifty cases. These cases were selected at random and included ten cases with no manifestation of deficiency and twenty-one cases with such manifestations. The yeast was administered for a period of thirty-one days to twenty-five of the patients. The remaining six failed to cooperate sufficiently to carry the observations to completion. In the discussion of the effects of the supplement, only the twenty-five patients who were treated for thirty-one days will be considered in the treated group.

After thirty-one days of Vitamin B complex treatment as described, the entire group of fifty patients was re-examined for the five possible manifestations of Vitamin B complex

deficiency. Six of the ten patients originally showing glossitis had received the yeast. None had glossitis upon re-examination. The remaining four cases with glossitis received no yeast. Three were free of glossitis and one was greatly improved at the end of the thirty-one days. One individual free of glossitis at the beginning of the test period showed slight redness of the tongue at the conclusion of the thirty-one day period in spite of having received yeast. It has been observed that the specific glossitis of pellagra may regress in late summer and early fall; this may be attributable to climatic change and/or to dietary changes which frequently occur at this season.[2] One or more of these factors may have operated in the patients whose glossitis cleared up without yeast.

Of nineteen cases of atrophy of the tongue, two of seven improved who received yeast and one improved without yeast.

No change was observed in ten cases of rhagades although seven had received the course of yeast.

Hyperkeratosis existed in twenty-three cases. Of twelve who received yeast, three were improved, whereas five had improved without yeast.

Results are synposized in Table I.

TABLE I

RESULTS OF CLINICAL OBSERVATIONS IN SERIES OF FIFTY PATIENTS WITH DIAGNOSIS OF PSYCHOSIS WITH CEREBRAL ARTERIOSCLEROSIS IN TREATED AND UNTREATED GROUPS

Abnormality	*Number cases showing abnormality*	Group 1 *(Treated—2 ounces Brewer's yeast for 31 days)*		Group 2 *(Untreated)*	
		Improved	*Unimproved*	*Improved*	*Unimproved*
Glossitis	10	6	0	3	1
Atrophy of tongue	19	1	6	1	11
Rhagades	10	0	7	0	3
Hyperkeratosis	23	3	9	5	6
Polyneuritis	0	0	0	0	0

The Relation of Vitamin B complex dosage in Alterations in Scores on the Wechsler-Bellevue Intelligence Test.

An attempt was made to test the mental ability of all fifty patients at the beginning of the investigation. However, some of the patients could not be tested because the Wechsler-Bellevue Intelligence Test depends upon ability to use language.[3] Seven of the patients did not understand English. In addition, many patients were too confused mentally or too ill to be tested. We, therefore, found that we could obtain I.Q.'s on only twenty-six of the fifty patients.

The verbal part of the Wechsler-Bellevue was given as the basis for determining the I.Q., as is provided for in the test. It was found impossible to give any item in the performance part of the test, with the exception of the Picture Completion test, as the other tasks necessitated manual or visual ability beyond the scope of the elderly patients. Patients were tested at the beginning and end of the thirty-one days. Every effort was made to establish rapport in spite of such handicaps as the fact that seven of the twenty-six were bed patients and several others were hard of hearing. In all cases the tests were given in privacy to minimize any emotional effects.

The content of the verbal part of the Wechsler-Bellevue Intelligence test includes the following items: (1) A general information test consisting of twenty-five items which "the average individual with average opportunity" may be able to answer; (2) A test of general comprehension comprising ten questions dealing with imaginary situations to which the individual replies on the basis of his past knowledge and ability to use common sense; (3) An arithmetical reasoning test consisting of ten problems of increasing difficulty; (4) A test of memory span for digits which involves the repetition by the individual of groups of numbers spoken aloud by the tester—this test is sub-divided into two parts. In the first part, the individual is re-

quired to repeat the numbers in the same order in which he heard them given, the second and more difficult part requires him to reverse the order of the numbers; (5) The similarities test which investigates the individual's ability to generalize, and to do logical thinking about the twelve pairs of words which are presented to him.

It is noted that in compiling the I.Q. tables in the Wechsler-Bellevue test the author of the test used a large number of elderly people in establishing norms and established norms for the higher age brackets. It is these norms which are used in this study, and form the basis of the I.Q.'s of the individuals tested in this study.

Twelve of the sixteen patients who received yeast improved in I.Q. Six patients who had not received yeast also improved. At the end of the month of yeast therapy, eight patients showed a decline in I.Q. of whom four had received yeast but four had not.

In the sixteen cases receiving yeast, irrespective of the presence or absence of clinical signs, the average *gain* per case was 3.06 I.Q. points, whereas in the cases which had not received yeast, the average *loss* was 0.1 I.Q. points.

The gain or loss in I.Q. points just cited involves qualitative as well as quantitative changes in each patient's test results. For example, a patient who did well at the first testing on the general information questions might do poorly on this part of the test during the second testing session, yet his improvement be such on other items that his total test score, and the resultant I.Q. show improvement. This variation from the first to the second testing of the individual's performance on the various items within the test indicates that improvement in scores can not be attributed to practice effects due to repetition of material.

An examination of the accompanying table

TABLE II

SHOWING CHANGES IN CLINICAL SIGNS AND I. Q. IN TWENTY-SIX PATIENTS BEFORE AND AFTER YEAST TREATMENT

Case	*Before Yeast*					*Yeast*		*After Yeast*			
	Glossitis	*Atrophy*	*Rhagades*	*Hyperkeratosis*	*I.Q.*	*Dose in ounces*	*I.Q.*	*Glossitis*	*Atrophy*	*Rhagades*	*Hyperkeratosis*
1	0	0	0	0	84	62	91	0	0	0	0
2	0	x	0	0	65	62	68	0	0	0	0
3	0	x	0	2	69	none	68	0	x	0	1
4	0	x	0	0	79	62	84	0	x	0	0
5	3	0	0	2	91	62	99	0	0	0	2
6	0	x	0	0	71	none	80	0	0	0	0
7	0	0	0	1	86	62	85	1	0	0	0
8	0	0	0	0	79	62	87	0	0	0	0
9	0	0	0	2	63	62	69	0	0	0	2
10	2	0	1	1	95	62	96	0	0	1	1
11	0	0	0	0	95	62	94	0	0	0	0
12	2	0	0	4	91	none	98	1	0	0	4
13	0	x	0	1	86	62	90	0	x	0	1
14	0	0	2	0	88	none	91	0	0	2	0
15	2	x	2	1	96	62	104	0	x	2	1
16	0	0	0	0	83	none	76	0	0	0	0
17	0	0	0	3	62	none	63	0	0	0	1
18	0	0	1	0	71	62	72	0	0	1	0
19	0	0	0	1	71	62	76	0	0	0	1
20	0	0	0	2	79	62	75	0	0	0	1
21	0	0	0	0	87	none	73	0	0	0	0
22	0	0	0	0	114	none	105	0	0	0	0
23	0	0	0	0	105	none	108	0	0	0	0
24	4	x	0	0	86	none	93	0	x	0	0
25	0	x	2	0	73	62	75	0	x	2	0
26	0	0	0	0	71	62	68	0	0	0	0

Key:
Glossitis, Rhagades, and Hyperkeratosis were designated as to severity on a basis of 1 to 4, the latter representing the most severe.
The presence of Atrophy is designed by an x.
The zeros indicate that clinical signs were absent.

(Table II) shows some relationship between remission of clinical signs and improvement in I.Q., whether or not yeast was taken. We can not, however, conclude that a month's yeast therapy will eliminate clinical signs and improve the I.Q., although yeast therapy may have a beneficial effect upon mental function as measured by the Wechsler-Bellevue Intelligence Test. The most reasonable inference at this time seems to be that the patients' improvement in I.Q. may be due to an improvement in general health as exemplified by the remission of clinical signs. Eleven out of the twenty-six cases which were tested by the Wechsler-Bellevue showed improvement in clinical signs and of these seven had received yeast. All but three of these same eleven cases showed an increase in I.Q. and two out of the three who did not improve in I.Q. did improve slightly in respect to hyperkeratosis while dropping slightly in I.Q. The third case, which showed a slight decline in I.Q., developed glossitis although the hyperkeratosis which had existed earlier had disappeared. These findings suggest there is some relationship between factors which produce an improvement in I.Q. simultaneously with remission of certain clinical signs, but no positive conclusion can be drawn until further investigation eliminates improvement in test scores due to increased rapport between tester and patient, or improvement in re-tests which may be due to familiarity with the test material.

Summary

In this preliminary investigation fifty elderly patients diagnosed as psychosis with cerebral arteriosclerosis were studied.

1. Of these fifty cases, seven having laboratory evidence of vitamin C deficiency, resulted in normal tests at the end of one month's treatment of fruit juices daily, which is beyond what would be expected from chance, but this treatment must be further investigated in order to draw definite conclusions.

2. All fifty of these cases were examined clinically for evidence of vitamin B complex deficiency at the beginning and end of a thirty-one day period. During this period thirty-one of the fifty cases, chosen at random, were given daily dosages of two ounces of Brewer's yeast. The remaining cases served as controls. It was thought preferable to use patients with the same diagnosis as controls rather than a more normal group.

Taunton State Hospital.

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Nicotinic Acid and Ascorbic Acid in Relation to the Care of the Aged

RUPERT A. CHITTICK, M.D. *and* ELMER STOTZ, Ph.D.
Waverley, Massachusetts

Dr. Chittick graduated from Harvard Medical School in 1929. He has been Certified by the American Board of Neurology and Psychiatry and the National Board of Medical Examiners. He is a member of the American Psychiatric Association and the New England Psychiatric Society. At present, he is Senior Physician at the McLean Hospital; Assistant in Psychiatry at Harvard Medical School; and Assistant in Psychiatry at the Massachusetts General Hospital. He is the author of several papers on clinical psychiatry.

Dr. Stotz received his B.S.C. from the Massachusetts Institute of Technology and his Ph.D. in Biochemistry from Harvard University Medical School. His past teaching positions have been held at Harvard, the University of Pittsburgh, and the University of Chicago. At present, he is Biochemist at the McLean Hospital and Research and Teaching Associate at Harvard Medical School. His past publications have dealt with respiratory enzymes, vitamin C reactions in tissues, and spectrophotometry. At present, he is engaged in problems of brain metabolism and clinical studies in the physiology of mental disease.

Recent advances in our knowledge of the chemical nature of the vitamins have made possible more definite investigations of their physiological action. During the past few months, the writers have been studying the rate of appearance of nicotinic acid and ascorbic acid in the blood stream following oral administration. These studies have been made possible by the development of more accurate chemical analytic methods. It was during the course of these studies that certain aspects related to the physiology of old age were noted, and the basis for this report established.

Nicotinic Acid

The literature concerning nicotinic acid is extensive and no attempt will be made to review it here. The variety of uses for which it has been recommended, however, would indicate that there is still a great deal of work to be done before our understanding is complete. Recently a group of investigators at the Bellevue Hospital[1] have called attention to a characteristic mental and physical picture resulting from nicotinic acid lack. While we have made no statistical study, it is our belief that a similar mental picture is seen rather frequently in early senile and arteriosclerotic psychoses. Tompkins[2] recently reviewed the records of 25 patients diagnosed as senile or cerebral arteriosclerotic psychosis who had been discharged from the hospital as improved. In 20 per cent of the cases, he found mention made of "a red tongue" or "glossitis" at the time of admission. These records were for the most part several years old and no special attention was given to evidence of vitamin deficiency so that this ratio is certainly too low.

A further point of possible interest is the effect of nicotinic acid on the circulation of the brain. The question has arisen in our minds whether the mental symptoms can be due to inadequate cerebral circulation. So far as the writers are aware, there is no proof that any vascular or circulatory changes occur in the brain following the administration of nicotinic acid. We know, however, that there is a transient flushing of the skin and a feeling of fullness in the head. Studies to determine the effect of nicotinic acid on blood flow have given contradictory results. A recent study[3] by means of a plethysmograph seems to indicate that an increase of blood quantity results in the upper extremities following administration of nicotinic acid, but that there is no increase in rate of blood flow.

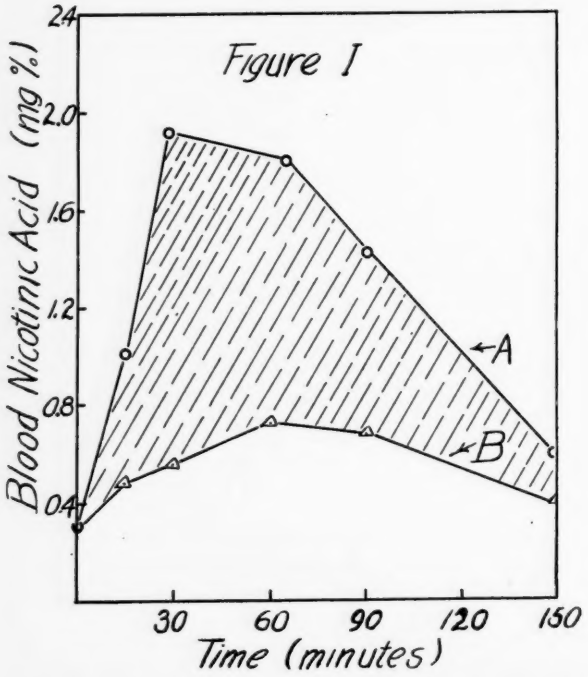
Method of Study

The investigation of which this report formed a part, consisted of the determination of the tolerance curve of nicotinic acid after it had been administered by mouth. The patients and controls had all been on their regular full diets. A fasting blood sample was taken and the patient was then given 10 mgm. of nicotinic acid per kilogram bodyweight. Blood samples were taken in 15, 30, 90, and 150 minutes. Analysis was made according to a method developed in this laboratory which is being reported separately, in detail.[4] This method employs an acid hydrolysis of a tungstic acid filtrate of the blood, to liberate the nicotinic acid from its combinations. This is then treated with cyanogen

bromide and p-aminophenol to produce a yellow color which is measured spectrophotometrically.

Results

Seven patients 65 years or older were examined and in each one the results were similar to curve A in figure I. However, it cannot be said that this curve is characteristic of elderly people, for the same type of curve was found scattered through several



age groups, both in the patient groups and in the control group of healthy, young adults. While the higher type A curve was found in all of the seven patients over 65, the other age groups varied from type A to type B with all variations between, so we are unable, at present, to make any correlation between age and tolerance curve.

In no case was there any physical evidence of nicotinic acid deficiency.

The fasting blood nicotinic acid levels varied from a low of 0.24 mg. per cent to a high of 0.515 mgm. per cent. No correlation of fasting levels with age or physical or mental health could be made.

After the preliminary curve was obtained, 5 patients were given 300 mgm. of nicotinic acid daily for about 3 weeks. At the end of that period, the test was repeated. The fasting level rose 0.2 - 0.3 mgm. per cent above the previous level, but the type of curve and degree of rise in the blood were unchanged.

So far as the chemical studies of nicotinic acid are concerned we are unable to find any distinguishing variation between young people and the aged. It is our impression, however, that several of the elderly patients appeared to be better physically after receiving nicotinic acid. This impression is gained from the general appearance of the patient and not single features capable of objective study. So far as we could tell, there was no change in the patient's mental condition following the use of nicotinic acid over a period of two to three weeks.

Ascorbic Acid

That there is an increased need for ascorbic acid in old age over that required during the prime of life, is indicated by several studies. Some of these studies[5, 6] have been so concluded on the basis of finding low fasting plasma ascorbic acid values in senility. Our work demonstrates that fasting levels alone do not give a satisfactory indication of the saturation level. We feel that Berkenau[7] established the fact more definitely by means of saturation tests. The accumulative evidence concerning the functions of Vitamin C makes these findings very important. To mention only a few, there is the possible relationship to cataract as pointed out by Bellows,[8] the more positive relationship to resistance to infection,[9] and the possible relationship to endocrine disturbances. There is an excellent review of the subject by authorities in the field in *The Vitamins,* published in 1939 by the American Medical Association. While many of these functions are still in dispute, the fact that there is any evidence to support them makes it important to keep the ascorbic acid level near the saturation point.

Method

The general plan is much the same as described for nicotinic acid. It was found necessary, however, to carry the test over a five-hour period in order to obtain a satisfactory curve. For this reason, the tests were begun early in the morning, after the patient had received a breakfast of coffee and toast. A blood sample was taken and the patient then given 6.0 mgm. of ascorbic acid per kilogram of bodyweight. The ascorbic

acid was dissolved in ½ glass of water immediately before giving it to the patient to avoid oxidation of the acid. Samples of blood were then taken at hourly intervals until five hours had passed. (Later it was found that satisfactory curves could be obtained from 4 blood samples instead of the original 6). The plasma ascorbic acid determinations were made by a method developed in this laboratory.[10] It is a modification of the Mindlin and Butler procedure,[11] with extraction of the unchanged 2, 6 dichlorophenol indophenol into xylene, which insures its stability.

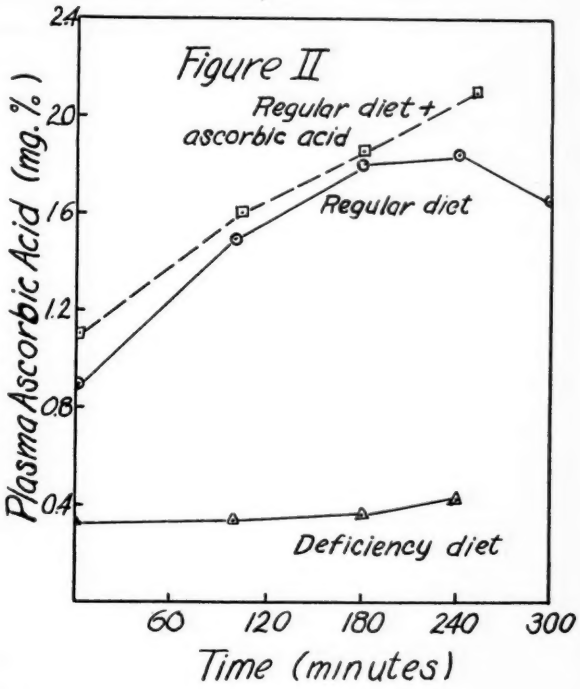
The results of each test were expressed in curves in which plasma ascorbic acid in mgm. per cent formed the ordinate and time in the abscissa.

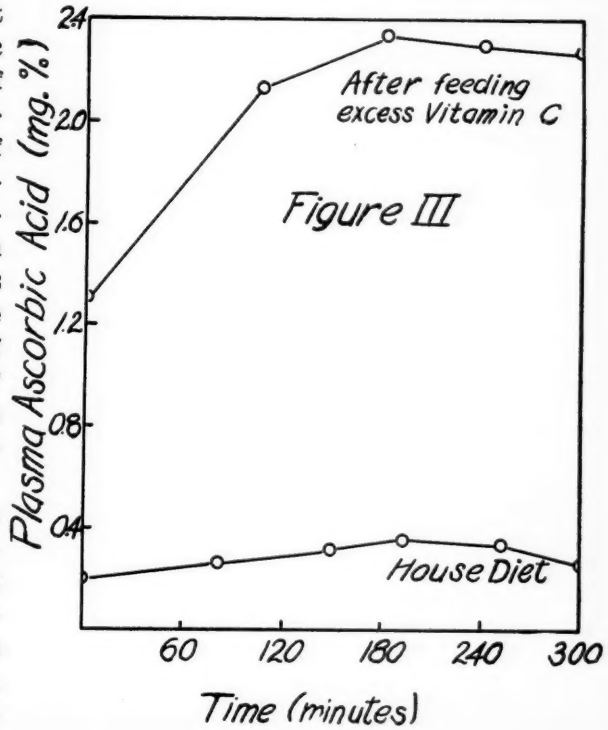
Results

In comparing 60 such "oral ascorbic acid tolerance tests" we have been able to explain the type of curve best on the basis of the state of saturation of the tissues. In subjects whose tissues are relatively saturated with Vitamin C, there is little tendency for the flow of Vitamin C from the plasma to the tissues, resulting in a marked rise of the blood curve, with little tendency to fall during the experimental period. In subjects with low Vitamin C reserves, the rapid absorption of vitamin into the tissues may keep pace with the rate of intestinal absorption and result in a complete lack of rise in plasma ascorbic acid during the test. Intermediate degrees of saturation may also be noted. That such differences are in fact related to the degree of tissue saturation was best shown in five subjects whose tolerance curve was changed experimentally by supplementary feeding, then deprivation of Vitamin C. Figure II shows such a case. Tolerance curves such as the lower one in this figure are indicative of Vitamin C deficiency or of "undersaturation" of the tissues. It is such curves that have been obtained in our group of seven senile subjects (See Figure III).

Although the rate of intestinal absorption is certainly an important factor in determining the shape of any individual curve, it appears from our data that the main determinant of differences in a group of curves is the relative saturation of the tissues. Thus, in the senile subjects, upon feeding supplementary Vitamin C, the tolerance curves in each case become typical "saturated" type curves. The initial curves obtained must, therefore, have been due to a Vitamin C deficiency rather than to any phenomenon of decreased intestinal absorption.

We feel there is little question, but that each patient was receiving what is ordinarily considered an "adequate" diet. The patients





were unusually well supervised and had all been eating full meals. Rather, we believe there is greater utilization of ascorbic acid in senility, or greater excretion, or both. We have some reason to suspect that in senile states the excretion is increased to a greater degree, but this point requires further investigation.

Conclusions

On the basis of work done so far, it seems justified to say that elderly patients should have their diets reenforced with both nicotinic acid and ascorbic acid. While the chemical studies do not demonstrate this need so far as nicotinic acid is concerned, clinical observation does. In the case of ascorbic acid, laboratory studies leave no doubt.

McLean Hospital.

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Investigations in Gerontology*

EDWARD J. STIEGLITZ, M.D.**

Bethesda, Maryland

The National Institute of Health of the United States Public Health Service is organizing a new unit for research into some of the many problems of aging. With the conspicuous shift to greater age in the population, senescent individuals are becoming increasingly significant in the national economy and defense. Preventive medicine must attack the practical problems of the rising proportion of deaths attributable to diseases of middle and later life and energetically attempt to augment the health and vigor of those past the meridian. Aging is a continuous biologic phenomenon which starts upon creation of a new individual and continues at variable rates until death. The problems of aging (gerontology) are not limited to the diseases of the aged (geriatrics), for the latter are the consequences of senescence. In man probably the most significant period of life for gerontologic study is late maturity, approximately the two decades between 40 and 60.

The problems of aging are logically divisible into three major fields of investigation: (1) the biology of senescence as a process, (2) the human clinical problems of aging and of diseases characteristically associated with advancing years which include the mental changes of senescence and senectitude as well as the physical changes, and (3) the socio-economic problems of a shifting age distribution in the population. The National Institute of Health is concerned chiefly with the first two of these divisions of the science.

In order to advise this new unit, there has been formed a National Advisory Committee on Gerontology, representative of the scientific thought of the Nation. The membership of this Advisory Committee includes:

Dr. L. R. Thompson, Director, National

* Not presented at the Symposium.

** In charge, Investigations in Gerontology, National Institute of Health, U. S. Public Health Service.

Institute of Health, U. S. Public Health Service.

Dr. Anton J. Carlson, Physiologist, University of Chicago, National Research Council.

Dr. Charles L. Christiernin, Association of Life Insurance Medical Directors of America; Medical Director, Metropolitan Life Insurance Co.

Dr. Robert A. Coker, Zoologist, University of North Carolina.

Dr. William Crocker, Botanist, Boyce Thompson Institute of Plant Research.

Mr. Lawrence K. Frank, Sociologist, Josiah Macy, Jr. Foundation.

Dr. A. Baird Hastings, Biochemist, Harvard University.

Dr. Ludvig Hektoen, Pathologist; Consultant, National Cancer Institute, U. S. Public Health Service.

Dr. Winfred Overholser, Psychiatrist; Superintendent, St. Elizabeths Hospital.

Dr. Clarence Selby, Industrial Physician; General Motors Corporation.

Dr. William D. Stroud, Clinician, Philadelphia, Pa.

The first service to scientific research which the Unit on Gerontology is undertaking is to conduct a survey of the present trends of active and contemplated investigations into the problems of aging in American scientific institutions. This survey is intended to ascertain just what problems are being studied and what methods of approach are being applied. There is no desire to learn, in advance of publication, the data being developed in these specific undertakings.

In addition to these studies, many investigations which do not pertain directly to aging should yield data useful to workers in gerontology. The Unit on Gerontology is especially interested in knowing of these indirectly related studies, the full implications of which are far too often obscured in their published titles.

Inquiries about studies related to aging are being sent to scientists in the basic biologic sciences as well as to clinical investigators, for much fundamental work upon the processes, mechanisms and consequences of senescence is probably going on in the sciences of botany, zoology, physiology, pharmacology, psychology, etc. From the clinical viewpoint, our greatest concern is with those studies dealing with health evaluation, mensuration of functional capacity (including criteria of "physiologic age") and with those diseases whose incidence increases sharply in later life (the so-called "degenerative disorders").

Critical analysis of the information elicited by such a survey may be expected to serve several valuable purposes. It should assist in bringing together in closer cooperation investigators interested in related problems, especially when widely divergent methods of approach are being utilized. The survey will likewise emphasize the urgent need for greatly augmented support for significant studies of these vitally important problems of senescence.

The broad and general pattern of the problems being investigated will undoubtedly reveal a number of neglected "Blank spots" which may justify special emphasis in the future. Analysis of the data of the survey will also be an invaluable aid in formulating future research programs, both at the National Institute of Health and elsewhere.

From preliminary inquiries it is observed that there is a great but largely latent and scattered interest in the problems of aging. It is the hope of the unit of geronotology of the National Institute of Health that the present survey may serve to effectively aid the promotion of closer cooperation of the scientists interested in these fields.

Information concerning subjects under investigation and the methods of approach is earnestly solicited. Letters should be addressed to—

Dr. Edward J. Stieglitz
In Charge
Investigations in Gerontology
National Institute of Health
U. S. Public Health Service
Bethesda, Md.

ABSTRACTS

Care of Aged Patients in Danvers State Hospital*

(Housing and Administration)

LEO MALETZ, M.D. *and* GRACE H. KENT, Ph.D.
Hathorne, Massachusetts

Dr. Maletz graduated from Tufts Medical School in 1932. Following his Interneships, he was Director of Lynn Adult Mental Hygiene Clinic from 1935 to 1938. At present, he is Clinical Director of Danvers State Hospital and Neuropsychiatric Consultant to Lynn Hospital. He is a member of the American Psychiatric Association, the Massachusetts Psychiatric Society, the New England Psychiatric Society, and the Massachusetts Society for Research in Psychiatry. Dr. Maletz is a Diplomate in Neurology and Psychiatry of the American Board of Neurology and Psychiatry.

In a recent study of 1200 cases collected in a consecutive series at Danvers State Hospital, nearly 30 per cent of the patients were over 60 years of age. Among the 345 aged patients of this group, 16 per cent died during the first month of hospital residence. This high death rate among aged patients places a very heavy burden upon the hospital infirmaries.

It appears that the aged population of our state hospitals is likely to go on increasing, in spite of all efforts to have these patients cared for in the community. It is, therefore, of great importance that institutional provision be adequate for their comfort and yet not too costly to the state.

A large proportion of our aged women are housed in a detached unit known as "Middleton Colony." This branch accommodates only 300 persons, and is not large enough to require the services of a resident physician; it is therefore necessary to transfer to the infirmary of the main hospital any patient who becomes seriously ill.

Aged patients can be cared for more adequately and economically when segregated to some extent than when kept in the same wards with younger patients; and the segregation is of advantage both to the older and the younger groups. Because of reduced physical activity and defective teeth, aged patients require an easily digestible diet such as would be quite insufficient for younger persons who are in vigorous health. Furthermore, aged patients need something distinctive in respect to supervision and nursing care. The ability to handle them with the minimum of friction is often a matter of personality rather than training, a special aptitude not necessarily possessed by all competent nurses. It is especially convenient to have infirmaries exclusively for aged patients, with crib beds for any who require them.

It would not be desirable, however, to have a state hospital given over entirely to the care of the aged. The work of such an institution would not be sufficiently varied for the psychiatric education and development of the staff. The problem of segregating the aged may be much better met by having a special unit as an affiliated branch of a large state hospital, so that the medical and nursing services may be influenced by the more stimulating atmosphere of the parent institution. Assignments to the service should be for limited periods, in order to discourage the workers from falling into ruts. The patients to be considered "aged" for purposes of classification should be selected from the hospital population in accordance with their capacity for physical and mental activity rather than strictly according to age.

The unit for the aged should be a progressive one, not a chronic service. The naturally heavy turnover by reason of deaths and admissions should be augmented by the return to the community, whenever possible, of any patient who has a partial remission between psychotic episodes.

Although a branch of a state hospital, such a unit may have a non-offensive and non-suggestive name. The buildings, which should be of one-story construction, may be arranged so as to form outdoor enclosures within which the patients may be permitted to roam about at pleasure with very little supervision. The

* Abstract of paper presented at the symposium.

enclosures should be roomy, well-shaded and attractively landscaped; but with no hiding places.

It cannot be claimed that Middleton Colony conforms in full to the ideal requirements here enumerated; but its general set-up might be found worthy of consideration for a state hospital which is in need of enlargement.

Danvers State Hospital.

The Electroencephalogram in Old Age*

P. A. DAVIS, M.A.
Boston, Massachusetts

Miss Davis is affiliated with the Department of Physiology of the Harvard Medical School and is a Research Fellow at McLean Hospital, Waverley, Massachusetts. She has published numerous articles on electroencephalography in such periodicals as the American Journal of Psychiatry, the Archives of Neurology and Psychiatry, and the Journal of Neurophysiology.

The significance of age in relation to the electroencephalogram (EEG) was examined in the records of 138 McLean patients which were compiled before they had received shock therapy. There were 17 patients of 70 years or over who were compared as a group with other large groups divided into decades, from 30 years of age.

There is a shift in the prominence of frequencies toward the slow end of the frequency spectrum in the group over 70 years of age. The fast alpha of 11 and 12 cycles does not appear, but 9 cycle alphas appear more often in this group. Too little time has elapsed since EEGs have been recorded to determine whether a person with an 11 or 12 cycle alpha at 50 years of age will have a 10 or 9 cycle alpha at 80 years of age. A study over a period of 3 to 4 years shows so far that the alpha frequency does not become slower or faster, even in a normal 90 year old woman. The alpha index decreases with old age, with a simultaneous increase in slow delta activity. In the group of 70 years or over, the decrease in the alpha index is permanent, and factors favoring alpha activity do not cause the index to increase. The delta activity appears in inverse relation to the loss of alpha activity.

As a whole, the pattern of the EEG of a very old person is more unstable, shows more distortion of wave form and a large amount of slow wave activity, giving the appearance of a "broken down" pattern, responding sluggishly and in a poorly organized manner.

The EEGs of the four oldest individuals in this study cannot be differentiated from some of the EEGs of younger psychotics, or normal but sleepy, adults. Thus, the neurophysiological condition of the brain, and not the factor of age in itself, determines the EEG pattern.

Harvard Medical School.

* Abstract of a preliminary report read by Dr. W. Sulzbach at the symposium. The final results will be included in a more comprehensive work by P. A. Davis.

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Newsnotes

LEGACY FOR PSYCHIATRIC UNIT

The Board of Administrators of Charity Hospital of the State of Louisiana in New Orleans, has recently been made the recipient of a legacy from the Correjolles estate. This legacy is in the form of a building in the center of the city of New Orleans, and approximately $120,000 in bonds. The terms of the will expressed the wish that a suitable building be erected for medical purposes to supplement the present hospital group, and also that the building to be erected shall equal in dignity the size of the legacy. This legacy was left with the express purpose that the building to be constructed shall be identified with Miss Celanire Correjolles' uncle and aunt and shall be known as the Joseph Lenes and Josephine Correjolles Lenes Memorial.

The Board of Administrators has expressed its desire to utilize this legacy in the construction of a psychiatric unit. They hope that it will be possible to obtain a Federal grant to supplement it sufficiently for the construction and maintenance of a thoroughly modern unit that will serve in the best capacity for the treatment of patients, and the teaching of medical students and nurses.

MEETING

The regular monthly meeting of the New Orleans Society for Neurology and Psychiatry was held at the City Mental Hospital, Thursday, December 5th, with Dr. G. F. Roeling as host. Dr. Irvin Wexberg presented a case discussion, "A Kinetic Epilepsy (Temporary Paralysis as Epileptic Equivalent)."

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